January 30, 2014

### ENGR110/210 Perspectives in Assistive Technology



David L. Jaffe, MS

Margaret Mongare





**Professor Drew Nelson** 

Proadpran P. Punyabukkana, PhD





## Today's Handouts, Signup Sheets, and Fillout Forms

For all students:

 Attendance List - important to verify your attendance at every class session

#### For all students and community members:

Class Session Evaluation Form

C				
Lecture Ela: Course Overview & In	Ernall address - WaterfurtLedu	Name of Enrolled Disatorit	Ereal address - Genetord site	Paarne of Eryndiant Disatlent
V.270.04511.000.0000.0000.000000000000000000	president and the second	Homes An Trans	and the second se	Ageneral April
		Denna, Cerror		details legal
Are you an enrolled student?		Ferman, Charles dimon		And addressing all Marriers Transmiss
The second states successively in the h		Passes, Dener Gamme		Figure, Front ( probile
The purpose of this quasicontaine is to h		Reservery Hurtle		Complete, Ware Neutronian Montas
195005 -		Samera, Sept	11	Gares Auto-Michael
D C O Roseker		Brees, Datels Disper-		Carpernet Anny Pasis
Ct Ct Ct speaking volume, under	the second se	Benarment Maritium, Million Tennet		Carter, Son Danierte
D D D cuality of PreserPrint of		Nargadien Stat		Canali Mercia, Viscott una Denastra
D D D steps presents knowle		Tari, Parisi Thing		Che Tree T
C C C stage presence, strate		Wahar, Mar		College Rouris Facinities
D D D presentation articlant, o		WHERE ADDED THE		Company's Diffs Corwin
D D D obcountity to: drawnow		Variation Might Destary Milarto		Sannards, Divising/ber Stated
D D provided good answers				Day Tarma
0 0 R Content:				Bully, Autors Nam
D D D Inde Internal		Procession and a strength of the		Thong Title Historie
D D D missions to the troat of		Other advantation and balant spectra		Formation, Arrists Rang
CICI CI commentation of new job				Barbs Locks Serg
CT CT CT commission interview				Rawlinson, Names & Lobiston
Carl Carl appropriate reversion of the				Multimeter, recent Rocketter
CI CI CI CARINI ANDA OI DIREGUI				survey, Name Annue
and the second se				January Changes
Please use the beak of this page to an				diversity, forgot its, press
you found the class session to be either				Waterman, New Yorking
What are used thoughts and the				Landson, Alle Texas
What did your cloughts are over				Laffant: Not Forms
what concepts are you expectat				Lagerth, Samia-Stern
C.6. 100 - 50 - 5				Biganing Vennis Direct
				No. of Cold Street,

	Perspectives in Assistive Technology - 2014 Class Session Evaluation
Lecture Dia:	Course Overview & Introduction to Assistive Technology - David L. Jeffe, MS
Are yo	u an anroled student? D - Yes
The purpose of ssues -	t this questionnaire is to help the leaching learn assess today's class session. Please rate the following
	Speaker: speaking volume, understandability, wase of following concepts and arguments, clarity of explementaries guality of PowerPoint addee, use of supporting modia (videos) and precentation aids (Show&Tell Items) stage presentation inductors, organization, page and management of allothed time opportunity for quasilationing and class engagement preceded pool answers, exempties, and dominant management preceded pool answers, exempties, and dominant management
0000000	Content: topic Internat metworkes to the bread accept of assistive technology presentation of new information appropriate level of detail and technical content overall value of presented material
Please use the you found the	beak of this seep to answer the following questions and to provide any additional comments, especially if class session to be ather G or (6).
What what	ate your thoughts and observations violat the entire cleas season? concepts did you especially like or wish were covered in more detail?

## **Upcoming Lectures**

- Tue Feb 4<sup>th</sup> Rehabilitation & Assistive Robotics
- Thu Feb 6<sup>th</sup> Issues of Human Interface Design
- Tue Feb 11<sup>th</sup> Assistive Technology Faire
- Thu Feb 13<sup>th</sup> Student Team Project Mid-term Presentations
- Tue Feb 18<sup>th</sup> VA Tour
- Thu Feb 20<sup>th</sup> Assistive Technology Opportunities in Autism
- Tue Feb 25<sup>th</sup> Motion & Gait Lab Tour
- Thu Feb 27<sup>th</sup> Designing Beyond the Norm to Meet the Needs of All People
- Tue Mar 4<sup>th</sup> Aesthetics Matter in Assistive Technology & Starting an Assistive Technology Company
- Thu Mar 6<sup>th</sup> Wheelchair Fabrication in Developing Countries
- Tue Mar 11<sup>th</sup> Student Team Project Final Presentations
- Thu Mar 13<sup>th</sup> Project Demos, Course Evaluation, and Celebration

## Miscellany



- 1. "Meet with Dave" sign-up sheet
- 2. Course website continuously updated with lecture slides, recorded audio, weblinks, photos (from Dave & Arne), handouts, and videos
- 3. Weekly project progress by email and/or meeting
  - Show me your sketches and prototypes
- 4. Margaret & Proadpran can help with your projects, presentations, and reports
- 5. Project progress don't wait on others
- 6. Anonymous Suggestion Box
  - <u>http://engr110.stanford.edu/suggestion.html</u>
- 7. Watch this TED video Meet the robots for humanity (10:22)
  - <u>http://www.ted.com/talks/henry\_evans\_and\_chad\_jenkins\_meet\_the\_robots\_for\_humanity.html</u>

## You Made the Call

Today's Discussion Options - Results:

- 1 Failure!
- 2 Famous People with Disabilities
- 10 Video Theater
- 5 Fun with Ethics
- 9 Vintage Assistive Technology

## "Failure is not an option"



Apollo XIII







Adam Savage Mythbusters

## "I have not failed. I've just found 10,000 ways that won't work."



Thomas Alva Edison

Dave says, "He could have benefitted from a better scientific understanding of the problem"



Seth Shostak SETI Astronomer

## "Trying is the first step towards failure"



Avoid failure by not making any attempts, or taking any chances

Homer Simpson Cartoon Father

## Messages

- Prototype early and often use sketches, crude models, <u>cardboard</u>-aided design (CAD)
- 2. Employ all your knowledge, senses, skills, and engineering intuition
- 3. Make good use of team members, coaches, resource people, teaching team, and facilities
- 4. Balance planning and fabrication tasks
- 5. Manage your time wisely, your most valuable resource
- 6. Don't expect a linear path of successes from beginning to end
- 7. Prepare to make mistakes and experience failures plan for them, understand them, learn from them, and try again
- 8. Don't get discouraged & don't give up

#### Famous People with Disabilities

#### Famous TV Characters with Disabilities





Raj – Selective mutism



Sheldon – Eidetic memory and mild OCD



Leonard – Asthmatic and lactose intolerance



Howard – Severe peanut allergy



Penny – No last name!

### Fun with Ethics

# Making Decisions

- 1. Everyone evaluates situations and makes decisions everyday
- 2. As one gets older, these decisions more frequently involve and affect others
- Tough decisions are often made using a complex combination of upbringing, economics, religion, law, individual notion of what is right, politics, and personal experience

Would it be wrong for a "normal" couple to abort a fetus diagnosed with dwarfism?

If two parents with Achondroplasia – an inherited form of dwarfism – wanted a child who looked like them, would it be wrong for them to terminate a normal-sized fetus?

Too Much Information – MIT Technology Review – Jan/Feb 2014 – page 72 - Link

Should everyone have a right to bear arms?

Should someone who is blind have a right to bear arms?

### Vintage Assistive Technology















## FES Walking



## FES Walking



### Chin Controlled Arm Exoskeleton



### **Robotic Feeding Aid**



### **Robotic Feeding Aid**



#### Early Environmental Control System



### Voice-Recognition Environmental Control System



#### **Eye-Gaze Control**



#### **Eye-Gaze Control**



#### **Augmented Communication System**



#### **Augmented Communication System**



### Steampunk Professor Xavier Wheelchair Project





### **Orange County Chopper**

• Christopher & Dana Reeve Foundation



## Video Theater

- What is the focus of the video?
- Is it a product, prototype, research, other?
- Product / research /concept:
  - Who does it benefit?
  - Does it have promise?
  - How useful is it?
  - What are the features?
  - What are the unknowns?
  - Is it cool?

## Video Theater

- grandma-faster
- basketball-commercial
- <u>6dot-labeler</u>
- glass-disability
- <u>robot-prosthesis</u>
- <u>keith-griffin</u>
- <u>diy-hand</u>
- <u>fighting-walrus</u>

- (0:32) AT&T It's Not Complicated "Grandma"
- (1:02) Guinness Beer Ad Highlights the Worth & Dignity of Human Life
- (2:28) Stanford grads' invention gives the blind high tech help
- (2:27) Navigating the world with Google Glass
- (3:00) Developing Better Robotic Prostheses
- (2:25) 'Keithbot' allows homebound student to attend class from home
- (1:36) DIY Prosthetic Hand & Forearm (Voice Controlled)
- (1:29) Fighting Walrus & Henry Evans: A Different View

<u>End</u>

## 6dot-labeler

Stanford grads' invention gives the blind high tech help From: ABC7 Video By: Jonathan Bloom

Designed by a group of recent Stanford grads, the six-dot labeler prints out sticky labels in Braille.

Watch the video (2:28) at: http://abclocal.go.com/kgo/video?id=8939813

## glass-disability

Navigating the world with Google Glass From: NBC Nightly News - 11/13/2013 By: Kristen Dahlgren

Google Glass apps are making a big impact on people with disabilities.

View the video (2:27) at:

http://www.nbcnews.com/video/nightly-news/53547412#53547412

## robot-prosthesis

Developing Better Robotic Prostheses From: Medical Design Technology - 01/23/2014 By: Tom Abate, Stanford University

A major motivation for this research is to build neurally controlled prosthetics to improve quality of life for amputees and individuals with paralysis. For these patients, signals in the brain that would ordinarily control arm movement are unable to get the muscles. The signals can be recorded directly from the motor cortex and decoded using an algorithm that translates neural activity into the movement of a computer cursor or robotic arm.

Read the entire article and view a video (3:00) at:

http://www.mdtmag.com/news/2014/01/photos-day-developing-better-robotic-prostheses

## keith-griffin

'Keithbot' allows homebound Kennard ISD student to attend class from living room From: KTRE - 01/17/2014 By: Francesca Washington

An injury that left one Kennard student unable to walk, isn't keeping him out of the classroom. Exactly a week ago, 15-year-old Keith Griffin was hurt at basketball game, but with the help of a robot, he won't miss any time in school.

Friday, Griffin maneuvered his way through the halls of Kennard High School from his living room.

Read the entire article an view a video (2:25) at:

http://www.ktre.com/story/24484454/keithbot-allows-homebound-kennard-isd-student-to-attendclass-from-living-room

**Back** 

## basketball-commercial

New Guinness Beer Ad Highlights the Worth and Dignity of Human Life From: LifeNews - 09/09/2013 By: Lauren Enriquez

Guinness has taken its advertising to a new level with an ad that is as man-oriented as it is inspiring and thought-provoking.

The one-minute commercial features a group of guy friends –all in wheelchairs– gathered for a competitive and adrenaline-charged game of basketball. The game is aggressive, and no one seems deterred by the precarious possibilities of collisions or falling over (both of which happen during the game).

Read the entire article and view the commercial (1:02) at:

http://www.lifenews.com/2013/09/09/new-guinness-beer-ad-highlights-the-worth-and-dignity-ofhuman-life/



## diy-hand

DIY Prosthetic Hand & Forearm (Voice Controlled)

"Do you live with only one hand, or ever feel two just isn't enough? Well now you can make another! This project combines two very cool things: an arduino voice recognition shield and an open-source 3D printed robotics project called InMoov. Basically what I've done is modify the InMoov hand/forearm to be usable as a prosthetic (or additional appendage) and add a VR (voice recognition) shield to receive verbal commands and then make corresponding motions with the hand. The advantage of voice control is that it doesn't require muscles and is more flexible to different physical conditions (also hands free!). My program includes 15 general hand gestures and actions for everyday living!"

Read the entire project and view a video (1:36) at:

http://www.instructables.com/id/Voice-Controlled-Prosthetic-Hand-Forearm/

**Back** 

## fighting-walrus

Fighting Walrus & Henry Evans: A Different View

Fighting Walrus is a company that adapted the Oculus virtual reality goggles to operate a quadcopter drone through custom software. With the help of Henry Evans, who is paralyzed from the neck down, they have been able to test this technology and realize Henry's dream of flying and taking aerial photography. The progress that this team has made will change people's lives by letting them see what they never could before.

View the video (1:29) at:

http://www.youtube.com/watch?v=ibe1jqfqyDE

## Tuesday, February 4th





#### **Rehabilitation and Assistive Robotics** Allison M. Okamura, PhD David L. Jaffe, MS

## Today



## A Tale of Two Wheelchairs

Teri A. Adams, JD

### Short Break





## **Break Activities**

- Stand up and stretch
- Take a bio-break
- Text message
- Web-surf
- Respond to email
- Talk with classmates
- Reflect on what was presented in class









### Short Break



## Miscellany



- Are these considered disabilities?
  - Stress, depression, pyromania, kleptomania, nymphomania, phobias