

January 30, 2014

ENGR110/210

Perspectives in Assistive Technology



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Margaret Mongare



Professor Drew Nelson



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Questions?



Upcoming Lectures

- Tue - Feb 4th – Rehabilitation & Assistive Robotics
- Thu - Feb 6th – Issues of Human Interface Design
- Tue - Feb 11th – Assistive Technology Faire
- Thu - Feb 13th – **Student Team Project Mid-term Presentations**
- Tue – Feb 18th – VA Tour
- Thu – Feb 20th – Assistive Technology Opportunities in Autism
- Tue – Feb 25th – Motion & Gait Lab Tour
- Thu – Feb 27th – Designing Beyond the Norm to Meet the Needs of All People
- Tue – Mar 4th – Aesthetics Matter in Assistive Technology & Starting an Assistive Technology Company
- Thu – Mar 6th - Wheelchair Fabrication in Developing Countries
- Tue – Mar 11th – Student Team Project Final Presentations
- Thu – Mar 13th – 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
 - <http://engr110.stanford.edu/suggestion.html>
7. Watch this TED video - Meet the robots for humanity (10:22)
 - http://www.ted.com/talks/henry_evans_and_chad_jenkins_meet_the_robots_for_humanity.html

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

failure is always an option



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

1. Prototype early and often – use sketches, crude models, cardboard-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

Famous TV Characters with Disabilities

Big Bang Theory



Famous TV Characters with Disabilities

Big Bang Theory



Raj – Selective mutism

Famous TV Characters with Disabilities

Big Bang Theory



Sheldon – Eidetic memory and mild OCD

Famous TV Characters with Disabilities

Big Bang Theory



Leonard – Asthmatic and lactose intolerance

Famous TV Characters with Disabilities

Big Bang Theory



Howard – Severe peanut allergy

Famous TV Characters with Disabilities

Big Bang Theory



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
3. Tough decisions are often made using a complex combination of upbringing, economics, religion, law, individual notion of what is right, politics, and personal experience

Situation 1

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

Situation 2

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](#)

Situation 3

Should everyone have a right to bear arms?

Situation 4

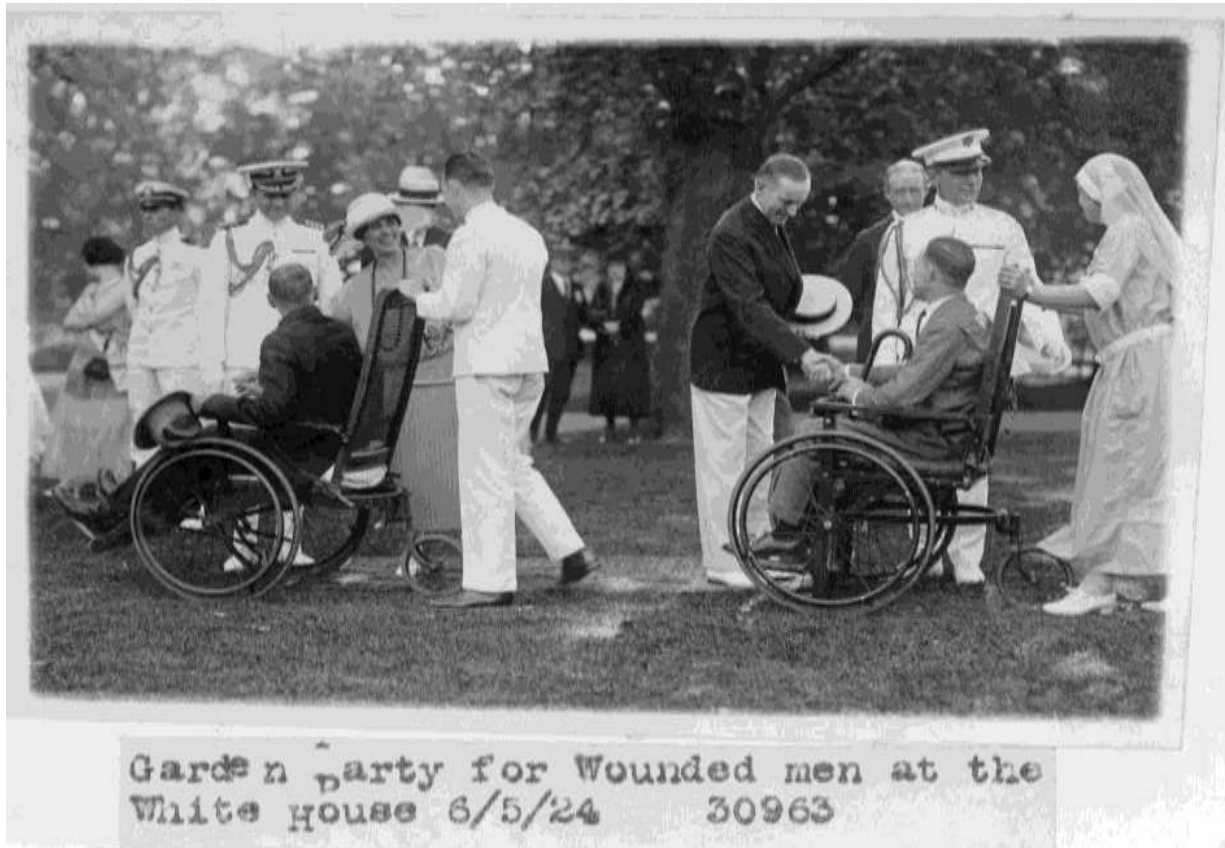
Should someone who is blind have a right to bear arms?

Vintage Assistive Technology

Old Wheelchair Designs



Old Wheelchair Designs



Old Wheelchair Designs



Old Wheelchair Designs



Old Wheelchair Designs



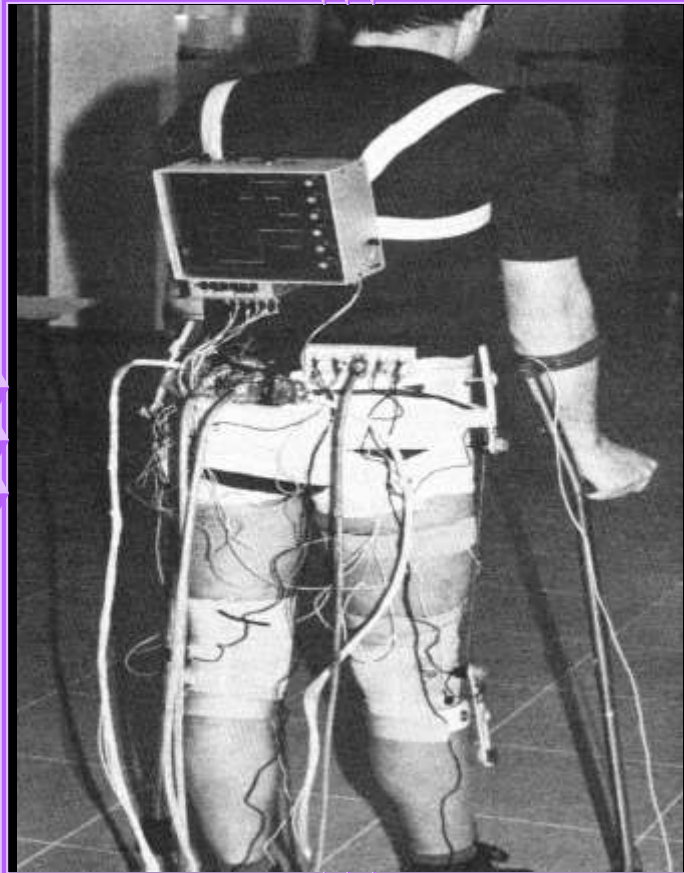
Old Wheelchair Designs



Old Wheelchair Designs



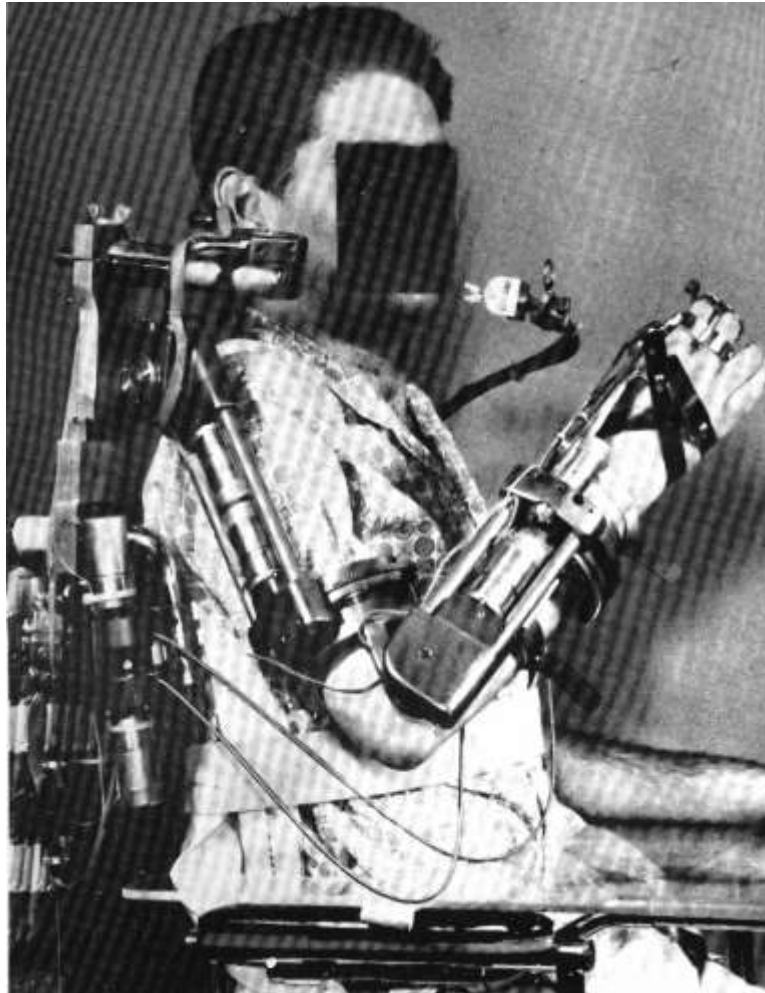
FES Walking



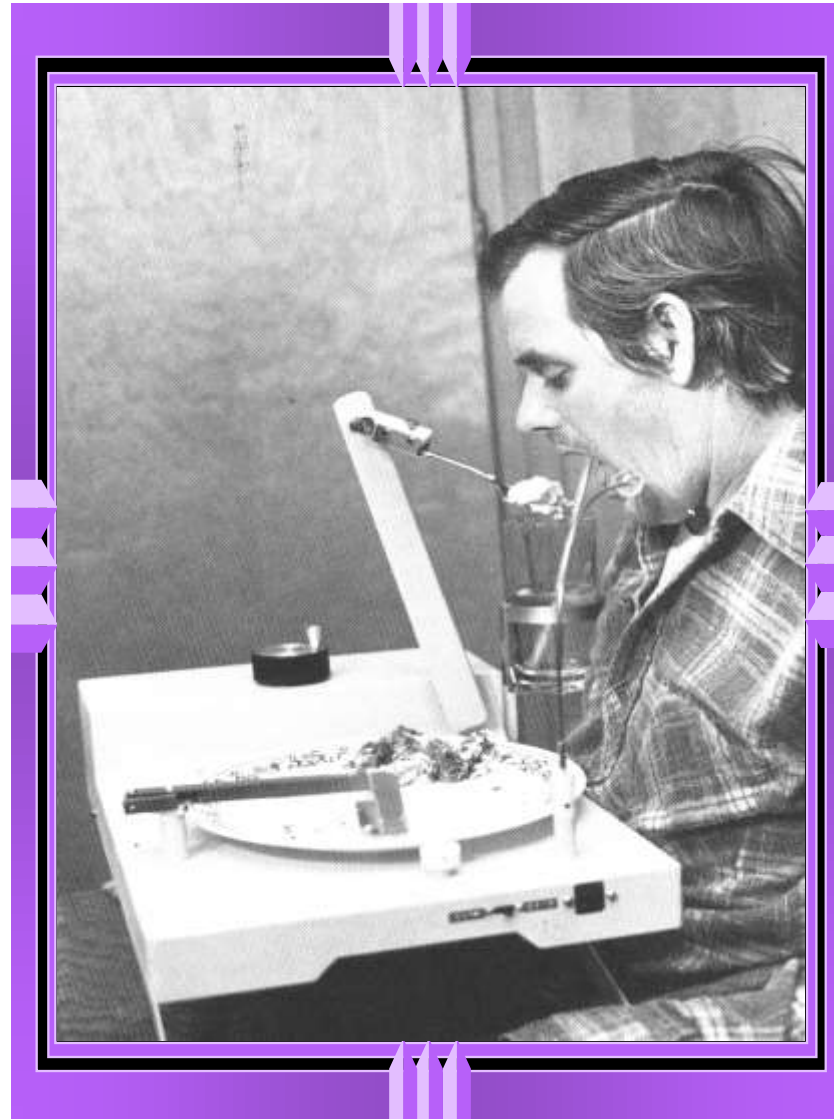
FES Walking



Chin Controlled Arm Exoskeleton



Robotic Feeding Aid



Robotic Feeding Aid



Early Environmental Control System



Voice-Recognition Environmental Control System



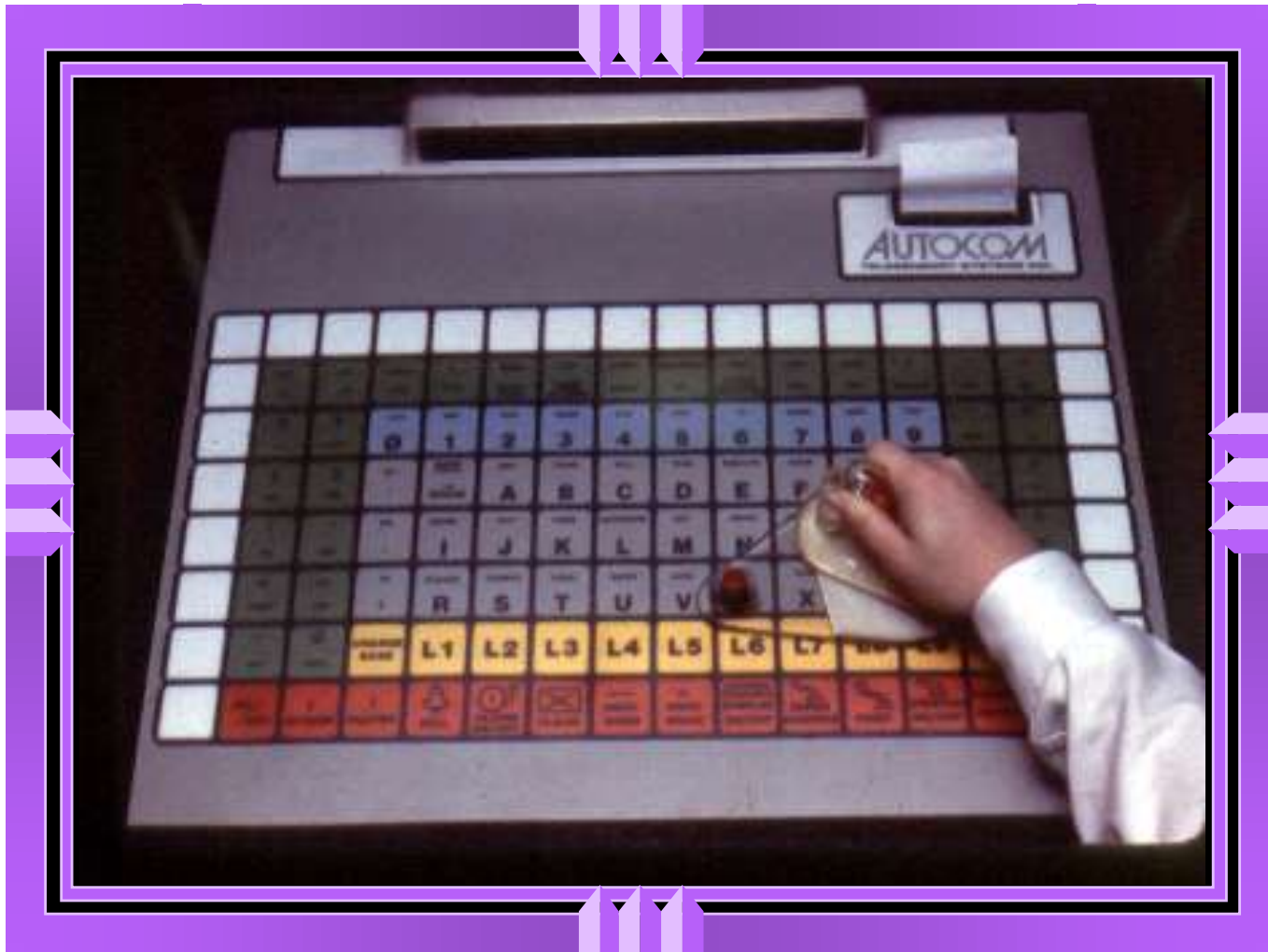
Eye-Gaze Control



Eye-Gaze Control



Augmented Communication System



Augmented Communication System



Steampunk Professor Xavier Wheelchair Project



[Video](#)

Steampunk Professor Xavier's Wheelchair
By: Daniel Valdez
<http://www.smeeon.com/>

Orange County Chopper

- Christopher & Dana Reeve Foundation
- [Video](#)



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](#)
 - [6dot-labeler](#)
 - [glass-disability](#)
 - [robot-prosthesis](#)
 - [keith-griffin](#)
 - [diy-hand](#)
 - [fighting-walrus](#)

 - [End](#)
- (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

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>

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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>

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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>

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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 and view a video (2:25) at:

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

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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-of-human-life/>

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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/>

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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>

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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



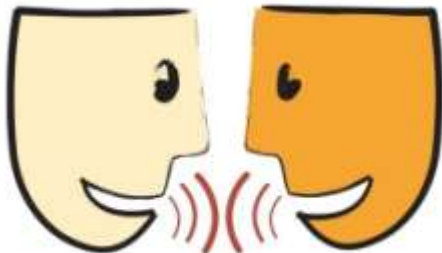
Short Break



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