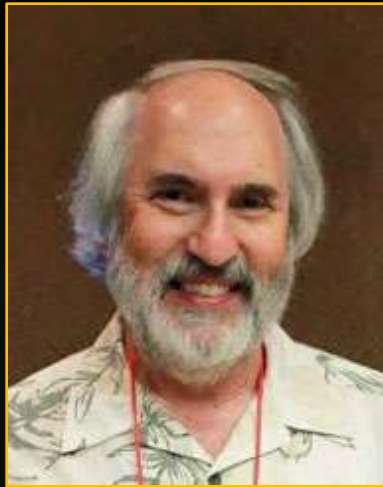


February 26, 2019  
Designing Exoskeletons and Prosthetic Limbs  
that Enhance Human Performance



# ENGR110/210

## Perspectives in Assistive Technology



David L. Jaffe, MS  
Instructor

**13**  
**Years**



# Questions, Comments, Suggestions, or Concerns?





# Cardinal Course - Student Survey



**Stanford**

Winter 2019  
Cardinal Course - Student Survey

Thank you for your feedback on the team project component in this Cardinal Course. We value your input on how community team project experiences can be improved in this and future courses.

What year are you?

Please indicate your major.

If applicable, please indicate your double major, secondary major, or minor.

Please indicate the name of the course you participated in:

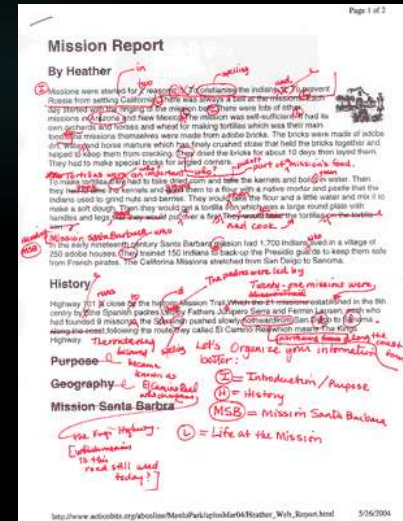
Did you participate in a team project?  
 - Yes     - No - Do not fill out this survey!

- ▶ For students working on team projects
- ▶ Surveys the community-engaged learning component of the course
- ▶ Provides the instructor with valuable feedback about students' team project experiences
- ▶ Communicates the impact of Cardinal Course to campus partners and external funders



# Mid-term Report Markups

- ▶ Teams are welcome to meet with me to discuss reports
- ▶ Some are comments, some are suggestions, some are corrections
- ▶ Some relate to syntax, spelling, grammar, format
- ▶ Reports should reflect a **professional** engineering style
- ▶ Not just for my viewing, practice writing professional journal articles and funding proposals
- ▶ An example for your future employer
- ▶ **Reports and presentations are key professional communication skills that must be mastered**



# Magical Bridge Playground



- ▶ Everyone seemed to enjoy the event
- ▶ What was cool?
- ▶ What did you learn?

# Upcoming Class Sessions

- ▶ **Assistive Technology Faire** - Thu, Feb 28<sup>th</sup>
- ▶ **Film Screening** - Tue, Mar 5<sup>th</sup> - Peterson Building
- ▶ **Wheelchair Fabrication in Developing Countries**  
- Ralf Hotchkiss - Thu, Mar 7<sup>th</sup>





# Week 10 Class Sessions

- ▶ Student Team Project Final Presentations - Tue, Mar 12<sup>th</sup>
- ▶ Student Team Project Demonstrations, Course Evaluations, and Celebration - Thu, Mar 14<sup>th</sup>





# Reminder - Work with Diligence



- ▶ Time is your team's most precious resource
- ▶ 2 weeks until final presentations!



# Pre-Lecture Discussion Topics



- 22 - Ethical / Moral Dilemmas Related to Disability
- 22 - In the News - New Assistive Technology products and research
- 20 - Assistive Robotics - Robotic technology benefitting people with disabilities and older adults
- 15 - Overview of Accessibility - How this design feature relates to products, with many examples
- 15 - Ten Commandments of Making - Adam Savage's Maker Faire video
- 15 - Video Theatre - Watch and discuss videos of new products and prototypes
- 12 - Vintage Assistive Technology - Products and devices from the past
- 12 - The Upside of Failure - Learning from prototypes that didn't work
- 12 - Who is Disabled? - Making a determination with limited information
- 12 - **Innovative Marketing Metrics - How we use words to measure and advertise**
- 9 - Famous people with disabilities - Focus on TV characters

# Which is Most Innovative?





# How much more Innovative?





# Innovation Quotes



“In a book I’m (Lee Vinsel) writing with Andrew Russell, *The Innovation Delusion*, we examine the origins of our culture’s current obsession with **Innovation**. We make a distinction between actual innovation, the **introduction of new things and practices into society**, and innovation-speak, the empty-headed and misleading ways people have come to talk about technological and social change in the past few decades.”

# Innovation Quotes

## INNOVATION QUOTES



Innovation is **overused**, focus on impact

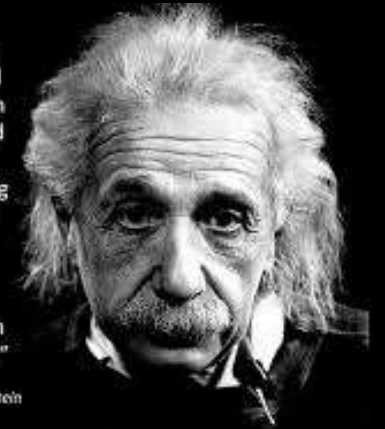
“**Innovation**. It’s kind of an odd word because it has a **very vague definition**. Generally, it means to create something so different from what’s been done before that simply calling it “new” isn’t quite right. The fact that the **definition of innovation seems to evolve** with each new technology breakthrough doesn’t make it any easier.” Kasey Panetta - Editor ECN

“**Innovation** is something that is both familiar and new.”  
Chief Innovation Officer

If Einstein took ENGR110/210, he would have said, “If I had a quarter to design and fabricate a solution, I would have spent a significant time understanding the problem”.

“If I had an hour to solve a problem and my life depended on the solution, I would spend the first 55 minutes determining the proper question to ask, for once I know the proper question, I could solve the problem in less than 5 minutes.”

- Albert Einstein



# Innovation Links



[Word 'Innovate' Said 650,000 Times at SXSW So Far](#) (satire)

[Employees Most Innovative When Brainstorming Dramatic Quitting Scenarios](#) (satire)

[Innovate the Way You Innovate!](#) (a real conference!)

"Forget everything you've ever learned about innovation and invention."



# Innovation Questions

- ▶ Is **Innovation** a design feature or property of a device?
- ▶ Is **Innovation** a binary feature or one that has a range?
- ▶ Is **Innovation** used because there is an unavailability of other means to measure the qualities of a device or design?
- ▶ Does the use of **Innovation** indicate a desire NOT to use a measurable engineering term?
- ▶ Does the use of **Innovation** mean that there is a lack of evidence that the device is actually useful?





# Innovation Questions



- ▶ What does it mean if XXX is **Innovative**?
  - ▶ Product
  - ▶ Person
  - ▶ Idea
  - ▶ Company
  - ▶ Process
  - ▶ Course
- ▶ What is the unit measure of **Innovation**?





- ▶ Certainly **Innovation** is generally thought as something **positive and desirable**, but why would someone use a word that is doesn't have a strong meaning or is actually measurable?
- ▶ My conclusion: **“Innovation” is a marketing / advertising term**, not a scientific term
- ▶ Saying something is **Innovative** implies that it a good product, worth purchasing. Of course in advertising, one doesn't actually have to prove that it is a good product.

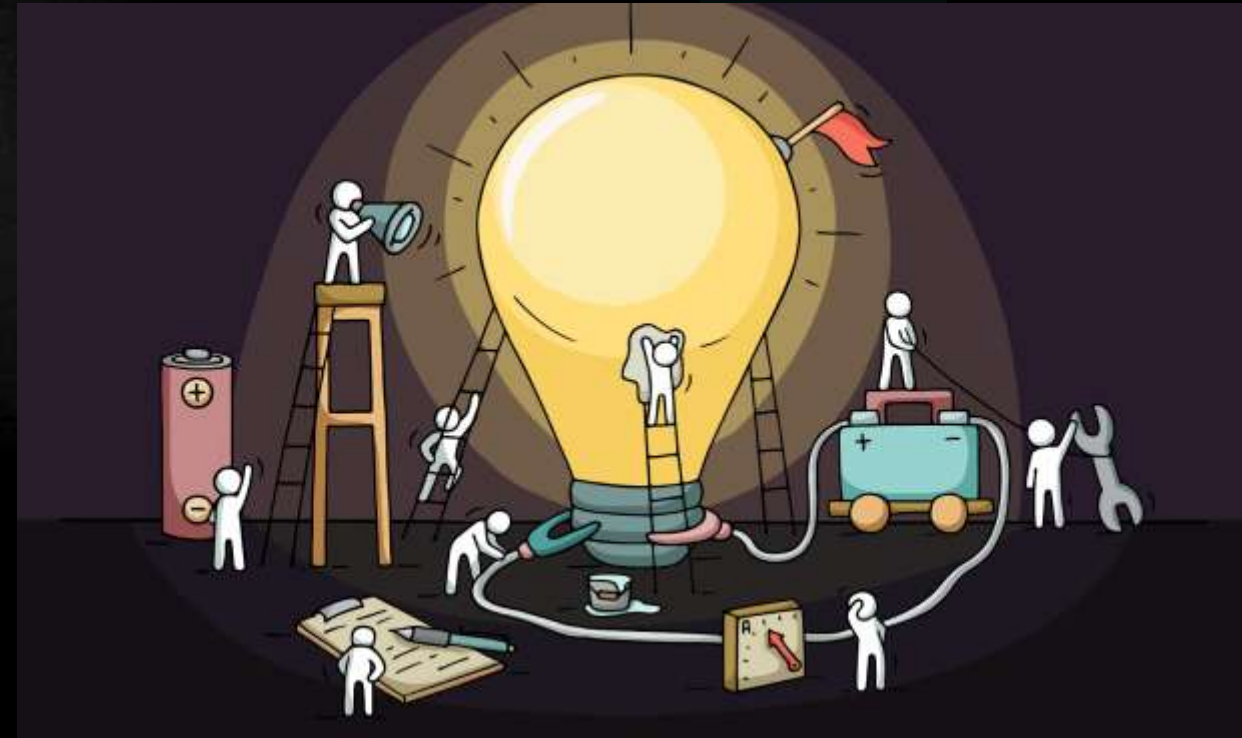
# Innovation



Beware of terms that describe a product, a person, an idea, a company, a process, or a course that do not have an objective measure.

Examples: Artificial Intelligence,  
Machine Learning

So, engineering students should not to use **Innovation** or **innovative** without describing exactly what they mean and their measurement technique.



# Thursday, February 28th



## *Assistive Technology Faire*

20 vendors of products, projects, and services





# Today



*Designing Exoskeletons and Prosthetic Limbs  
that Enhance Human Performance*

Steven H. Collins, PhD

Stanford University - Mechanical Engineering Department

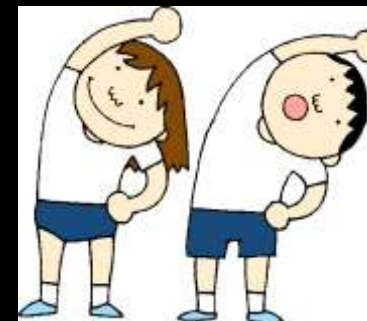
# Short Break



# Break Activities



- ▶ Sign attendance sheet
- ▶ Grab a cookie
- ▶ Stand up and stretch
- ▶ Take a bio-break
- ▶ Text message, web-surf, email
- ▶ Talk with classmates
- ▶ Reflect on what was presented in class



# Questions?





Adjourn



class dismissed



# Laptops Galore



# Time for Questions?



End the class

