

February 27, 2020

*Designing Exoskeletons and Prosthetic Limbs that Enhance
Human Performance - Steven H. Collins, PhD*



ENGR110/210

Perspectives in Assistive Technology



David L. Jaffe, MS
Instructor

14
Years

Questions, Comments, Suggestions, or Concerns?



Please notify me of your comments, suggestions, and concerns so I can explain / address / correct them before the end-of-term course evaluation.

Attendance Sheet, Evaluation Form, and Meet with Dave Signup



For all students:

- Attendance Sheet
- Meet with Dave signup

For everyone:

- Class Session Evaluation Form

A 'Class Session Evaluation Form' for 'Perspectives in Assistive Technology - 2020'. It includes sections for 'Are you an enrolled student?', 'Speaker's overall presentation', 'Presentation content', and 'Submit your comments, questions, and suggestions'. It also has a 'Send to this form' button.

Class Session Evaluation Form

An 'Enrolled Student Attendance List' for 'ENGR1100210' on 'January 7, 2020'. It is a table with columns for 'Student Name', 'Enrollment Status', 'Attendance Status', and 'Notes'. The list contains names of students and their corresponding attendance records.

Attendance List

A 'Sign Up to Meet with Dave' form. It includes the text 'Before class outside Thornton 110' and 'After class in Thornton 110'. It features a table with columns for 'Date & Time' and 'Enter Your Name & Specify 15 minute time block'. The table lists dates from Monday, January 13th to Friday, January 18th, with corresponding time slots.

Meet with Dave Sign Up



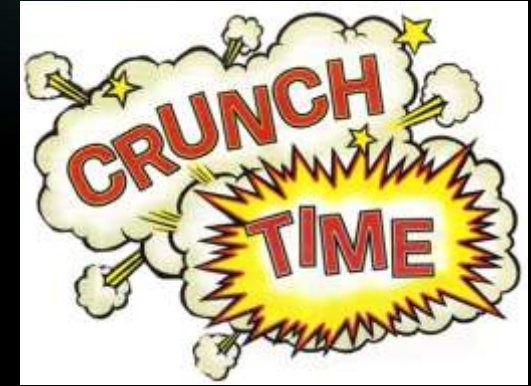
Reminder - Work with Diligence



- ▶ Time is your team's most precious resource
- ▶ 12 days until project presentations!
- ▶ 2 weeks until project demonstrations



Week 8



- It's crunch time
- Brainstorm, Select, Prototype, Test, Analyze, Repeat
- Inform me of your team's progress



Week 9 Class Sessions

- ▶ Tue, Mar 3rd
Film Screening in Peterson Atrium
- ▶ Thu, Mar 5th
Wheelchair Fabrication in Developing Countries



Excused from Film Screening



- ▶ Teams can **request to be excused** from the film screening on Tuesday to work on their projects
 - ▶ **All team members must be up-to-date on missed lectures**
- ▶ *Fixed: The Science / Fiction of Human Enhancement* DVD is available for overnight loan by students



Week 10 Class Sessions

- ▶ Tue, Mar 10th
Student Team Project Final Presentations



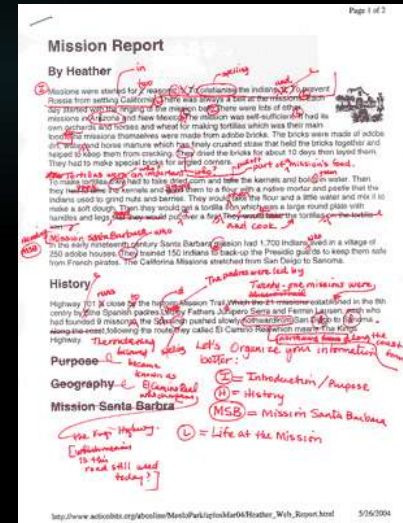
- ▶ Thu, Mar 12th
Student Team Project Demonstrations, Course Evaluations, and Celebration

Students working on 1 and 2 unit projects are required to attend



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**



Discussion Topic Preferences



- 33 - Assistive Robotics - Robotic technology benefitting people with disabilities and older adults
- 28 - In the News
- ~~24 - Ten Commandments of Making - Adam Savage's Maker Faire video~~
- ~~23 - Ethical / Moral Dilemmas Related to Disability~~
- ~~22 - Product Pricing~~
- ~~21 - Overview of Accessibility - How this design feature relates to products, with many examples~~
- 21 - The Upside of Failure - Learning from prototypes that didn't work
- ~~16 - Vintage Assistive Technology - Products and devices from the past~~
- 16 - Video Theatre - Watch and discuss videos of new products and prototypes
- 14 - Who is Disabled? - Making a determination with limited information
- 10 - Innovative Marketing Metrics - How we use words to measure and advertise
- 7 - 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

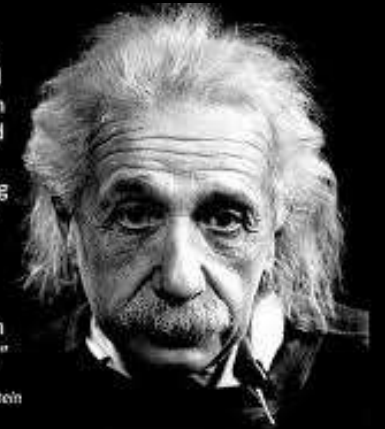
“**Innovation**. It’s kind of an odd word because it has a **very vague definition**. Generally, it means to create something so different from what’s been done before that simply calling it “new” isn’t quite right. The fact that the **definition of innovation seems to evolve** with each new technology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

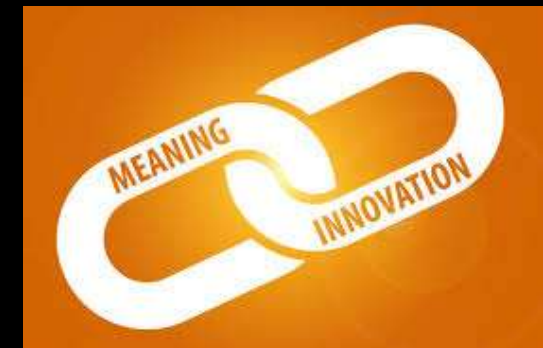


[Word 'Innovate' Said 650,000 Times at SXSW So Far](#) (satire)

[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 avoid 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

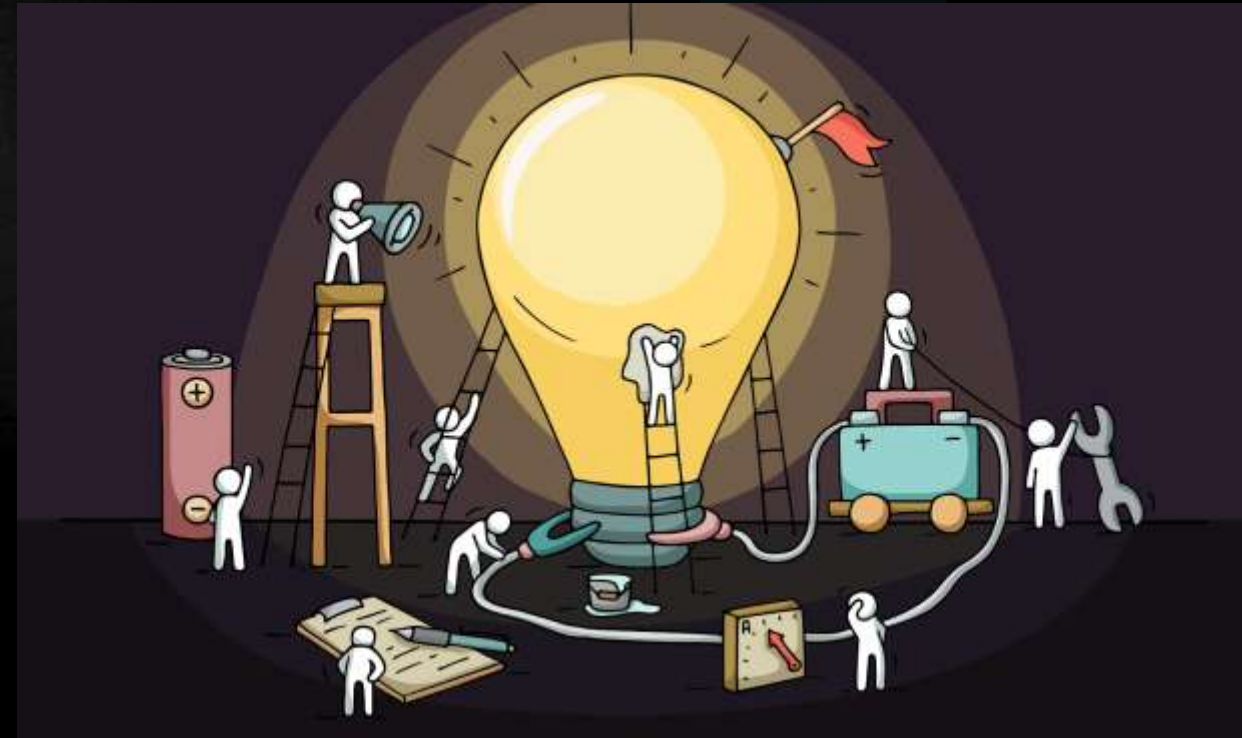


Beware of terms that describe a product, a person, an idea, a company, a process, or a course that do not have an objective measure.

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.



Tuesday



Film Screening - Fixed: *The Science / Fiction of Human Enhancement*

Peterson Atrium

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Today



Designing Exoskeletons and Prosthetic Limbs that Enhance Human Performance

Steven H. Collins

Stanford University - Mechanical Engineering

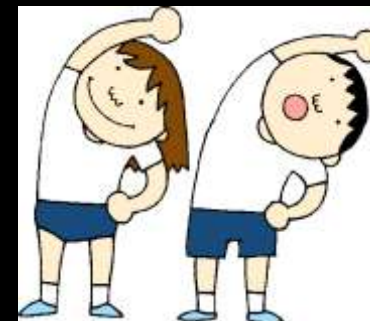
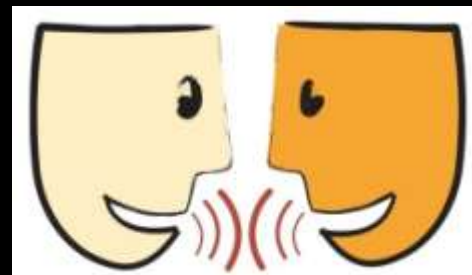
Short Break



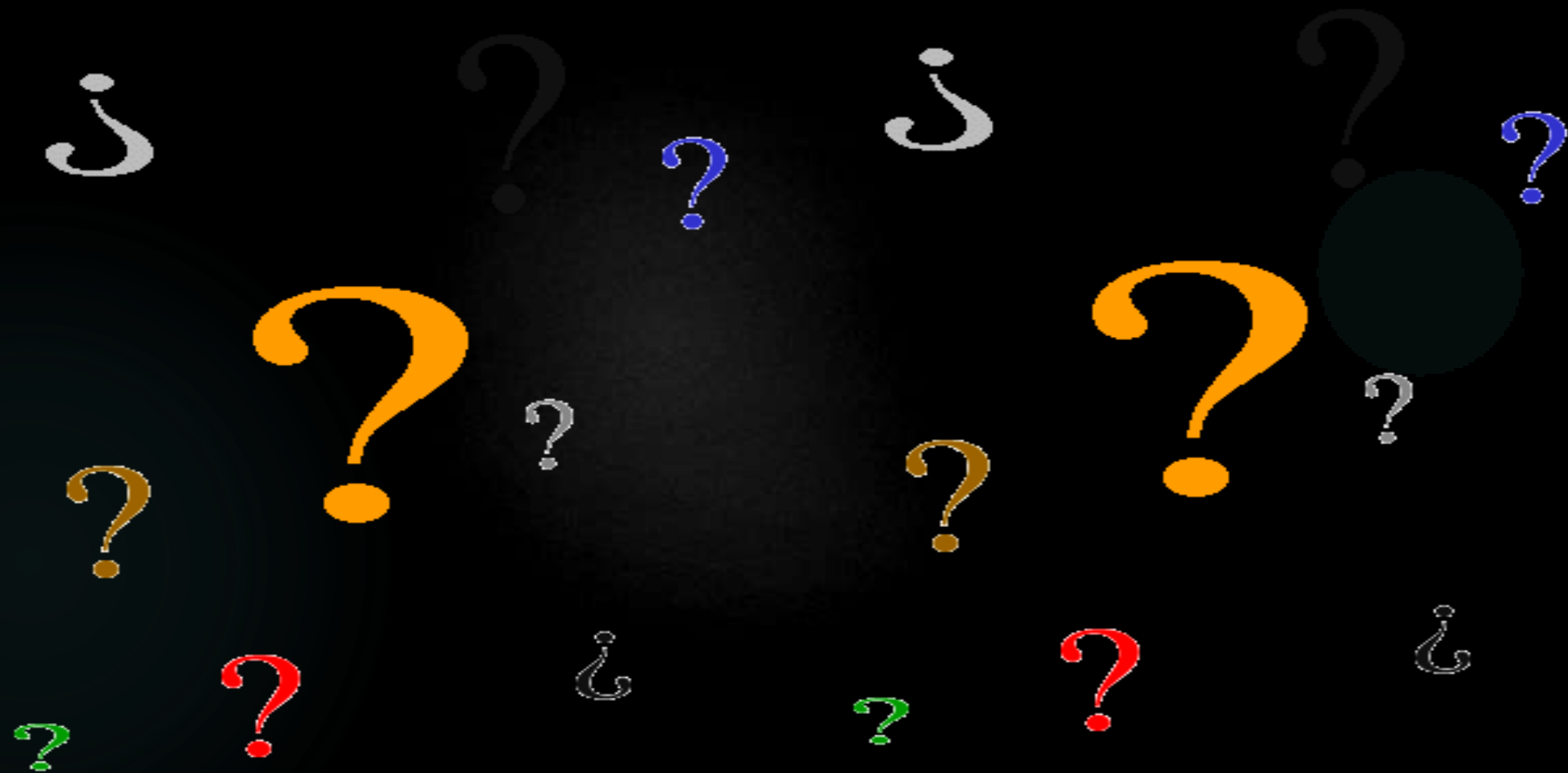
Break Activities



- ▶ 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

