ME-410 Mechanical Product Design & Development

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Last week: Clear problem statements

- Problem
  - is it a real problem?
  - Is it realistic problem ?
  - does it need to be automated? does it need to be **sensed/ actuated**? (folding chair)
- State of the art
  - What exists? What's missing?
  - Does a solution exist? Is it too simple? Why does it not exist ?
- Solutions
  - Could the developed technology transfer for other applications? (weight lifting belt vs posture correction, adjusting hiking boots vs workout pads?)

Last week : Metrics

- How easy is it to create a benchmark for measuring problem conditions (visor hat, snood, shoelace)
- Create solution that can be measured.
- If there were to be a 2nd ,3rd version of the design, what would be optimized (why not materials, costs, weight?... What is a robust design?)

Next week : presentation format

- 1 presenter / group – should change every week
- Everyone should know what is presented
- Use the given format on moodle
- Put the group members names on the first slide

Next week : decisions!

- **Choose your product**
- what problem does it solve? Why has it not been solved yet ? Is it a real problem?
- Can you make a realistic / believable demo in next 10 weeks ?
- Careful that you have a distinctive actuator and sensor solution
- If you are going to give haptic feedback, careful it gives a force feedback.

Next week : decisions!

- **Choose your product**
- Don’t forget the power supply – demo / reality
  - Suggestion : instead of everyday outside activities consider therapee / diagnostics?
- How easy is it to create a benchmark for measuring the problematic conditions and its improvements?
  - Solution : maybe not be the same scenario, but the similar motion?
- Create solution that can be measured.
  - Suggestion : ask how you can quantify “comfortable” “easy” etc
- If there were to be a 2nd ,3rd version of the design, what would be optimized toward a robust (that is independent of materials, costs, weight?... What is a robust design?)

NEXT WEEK : Actuator and sensor solutions

- Slide 1: **Choose your product** what problem does it solve? Why has it not been solved yet? How does it work?
- Slide 2: **3 different combinations of solutions (motor & sensor choices)**
- Slide 3: **What will you measure ?** and how will it impact your functionality?
  - Not off/ on (i.e. need to be modulated with a force feedback)
  - Could the values be measured ? (can you measure comfort? Easiness? Intuition ? If not, what can be measured?)

This week's lecture

- Hardware and Closed-Loop Control Systems for Automation
  - What is a closed-loop system in mechanical engineering?
  - Why we need closed-loop systems?
  - How to build a closed-loop system in your project?

- Introduction to Automated Actuation and Sensing in Robotics
  - Essential elements in a closed-loop system.
  - SoAs in actuators and sensors.
  - Critical toolkit for your projects.