Week 5

Dr. Yuhao Jiang

Reconfigurable Robotics Laboratory

EPFL, Switzerland

By this week

Slide 1: Final solution: concept components

- Decision reasoning on the motor and sensor
- Small sketches of other solutions of the dropped solutions
- Run a quick calculation to show the functionality with the chosen dimensions

Slide 2: Final solution: working principle

- Sketches of the product's working mechanism – schematics
- Control loop schematics

Slide 3: Final solution optimization

- identify 1 critical design dimensional parameter / sets of parameters to optimize toward improving the functionality (engineering specification) → push the dimensional limit

By this week

- **“Improvement column”** of the motor + sensor solution based on the design:
  - pick a parameter in the engineering specification
  - Iterate design parameters (size of the pouch / spring constant / link dimensions) to improve the functionality/ engineering specification

Engineering specification	values	Solution A	Solution B	Solution C
Range of motion	90< hinge range <300	200<r<300	90<r<100	40<r<41
Overall payload	10N < load	20N	13N	50N
Bandwidth rpm	100<rpm	200	101	100

By next week

- **“Improvement column”** of the motor + sensor solution based on the design :
  - pick a parameter in the engineering specification
  - Iterate design parameters (size of the pouch / spring constant / link dimensions) to improve the functionality/ engineering specification

Engineering specification	values	Solution A	Solution A - improved
Range of motion	90< hinge range <300	200<r<300	200<r<400
Overall payload	10N < load	20N	30N
Bandwidth rpm	100<rpm	200	200

By next week

- Slide 1: Clean scenario – clear need for the function
  - Schematics for the working principles
  - Hardware Design
  - Control strategy
- Slide 2: what will the functionality be measured?
  - How is it improving the world without the product? – before and after (quantify)
  - What is the prediction? (compare)
- Slide 3: Update of the current project stage
  - What are the next steps? For each members?
  - Role division among the members

2nd /3 Order

Deadline: Oct. 17 EOD

Total budget: 250 CHF

Venders:

Digikey.ch
(Electronic components)
(Mixed/specialty electronics, motors)

mouser.ch
(Mixed/specialty electronics, motors)

digitec.ch or galaxus.ch
(General components)

distrelec.ch
(Special Electronic components)

uk.misumi-ec.com/
(Materials)

tme.eu
(Electronic components, motors)

uk.rs-online.com
(Development shields and other components)

Today's Lectures

- Dynamic Modeling and Simulation-based Optimizations
- Electric Motor Selection and Transmission Design for Robotics
- Demo: Servo motors