Week 4

Dr. Yuhao Jiang
Reconfigurable Robotics Laboratory
EPFL, Switzerland

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Technical Requirement

1. **Closed-loop system:** Your device must sense, process, and regulate in real time. Pure on/off or open-loop behavior is not sufficient.
2. **Minimum components:** At least two actuators and two sensors. You may use the same actuator type if it performs distinct functions.
3. **Novelty relative to past projects:** Your project must not overlap in functionality with previous ME-410 projects. Simply changing the application context without adding new functionality is not enough. You're welcome to add meaningful new capabilities to make it distinct.
4. **Real, meaningful problem:** Your project should address a genuine, well-motivated challenge. Please avoid "fabricating" a problem just to fit the assignment—justify the need with a clear use case, users, and expected impact.

Grading

- 70% Project (20 % Final Report, 20 % Final Presentation, and 30 % Working Prototype Demo)
- 30% Participation (Weekly presentations + participation, mandatory!)
- Everyone in the group will receive the same final grade for the report / presentation / prototype but participation grade may vary.
- Each group is expected to produce update slides prior to the class for presenting to the instructor during the individual group meeting.
- Written report should follow the sample report format

Demo Day Grading Scales
Cohesive Scenario (10%)
Clear motivation and communication for the need of the product (10%)
Concept novelty (20%)
Maturity of the prototype (20%)
Application of novel technology (20%)
Poster (content and design) (10%)
Videos and other visual aids to communicate better the concept and working principle (10%)

Final Presentation Grading Scale
Organization (20%) Clear goal Clear engineering approach Clear solution selection Timing
Presentation (30%) Audible and confident presentation Cohesive and coherent slides Visually and content-wise illustrative slides Well-practiced talk
Technical Quality (40%) Clear engineering specifications and approach methods Good solution with clear justification Clear presentation of pros and cons of the suggested solutions Analytical and engineering approach to the solution Present and defend the design options during Q&A
Project Participation (10%) Active weekly TP participation Team effort Quality improvement over the semester

By this week

- Slide 1: Updated motivation functionality definition with the updated state of the art (more details due to the solutions)
- Slide 2: Three solutions comparison Back hand calculation for all three solutions
- Slide 3: Final solution slide decide on the final solution direction and the motor and sensor types.

By this week

- Solutions that vary in performances not on design or motivations (e.x. as below)

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

By Next 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

- Slide 3: Solutions that vary in performances not on design nor motivations

Engineering specification	values	Solution A	Solution B	Solution C	Solution B’
Range of motion	90< hinge range <300	90<r<100	200<r<300	40<r<41	200<r<300
Overall payload	10N < load	13N	20N	50N	30N
Bandwidth rpm	100<rpm	101	200	100	200