Final Project Description and Requirements

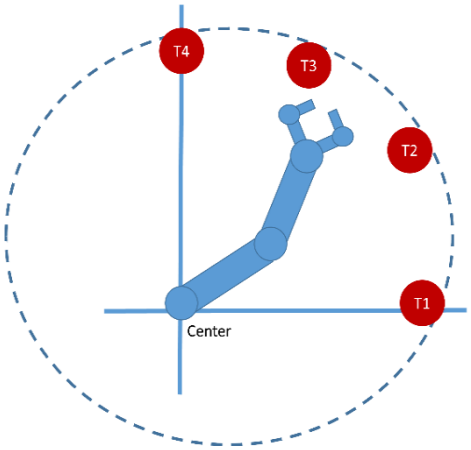
Due Date: May 18, 2023

No extensions. Early submissions highly encouraged.

The following deliverables will be required by due date:

- Project Design, Demonstration **[20 points]**
- 2-Page Project Report **[10 points]**
- Integrate Hand from HW 6 into the project **[3 Bonus points]**

Project Design



- A Brain Computer Interface that can control a 2-dimensional arm and hand/claw control is to be demonstrated.
- A 2 DoF arm that can move in 2D space and 4 DoF hand/claw that can grasp an object are to be designed and controlled.
- A state machine needs to be designed to control the arm in the following states: (i) Start State (ii) Center Position (iii) Hold (iv) Target Position (v) Hold (vi) Grasp a Ball/ Grasp a Pen (vii) Hold. Be able to repeat the above actions to cover any target shown above.
- Target position is provided by two constants. Signal to grasp a ball or a pen is also provided by another constant. These constants represent the motor intent derived from arm and hand motor cortical regions.
- By using the inverse kinematics model, the arm should navigate from center to the target position. In grasp state the arm is locked to the target position and should not move. In this state, the claw/hand needs to grasp a ball.
- The arm should not be able to rotate 360^0 in 2D plane. Restrict its movements to approximate human reach range.
- A pdf of screenshots of SIMULINK code needs to be uploaded along with the actual code emailed to the instructor.

Project Report

1. The report needs to be written in the form of a 2-page IEEE Conference Paper. Use appropriate format for text and references as provided in the IEEE Paper MS Word/A4 Template that can be obtained here: http://www.ieee.org/conferences_events/conferences/publishing/templates.html
It is important to follow the format for text, figures and references.

2. The report will have the following sections: Abstract, Introduction, Methods, Results, Discussion, Conclusion and References. In the Abstract, please give an overview of the project. In the Introduction use about three paragraphs to talk about virtual reality models by others with references. In the Methods describe the method of design. Results will have several figures/snapshots of arm reaching and grasping in different states with their descriptions. Include figure captions. Discussion will have how well the model accurately represents human arm and hand. What possible improvements are, etc. You can refer to models by others as appropriate with references. Conclusion will have a few sentences of overview with closing remarks.