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**Goal:**
This lab is a competition in which you will design, build, and program a “sumo wrestler” robot. You will compete with other groups in robot sumo matches, where the goal is to push the opponent out of the ring while remaining in the ring yourself.

**Setup:**
In each lab section each team will play all others in a round robin tournament.

**Tournament Rules:**
Ranking will be determined with the following points system
- Winning a match gives 3 points
- Drawing gives 1 point.
- Losing gives no points.

**Match Rules:**
Matches begin with two robots placed opposite each other and facing away from each other in a small ring. The ring’s boundaries will be marked by black tape. Robots must push opponents out of the ring while staying inside the ring themselves to win rounds. A match ends after 4 minutes or if a robot is 2 rounds ahead.

- No human interference is allowed after the robots have started running their program.
- The TA’s will determine at what point a robot is considered “out” and a round is finished.

You will be allowed to use up to 3 sensors and 3 motors on your NXT.

**Grading:**
Labs will be marked out of 25 points, broken down as follows:
Brainstorming and Pseudo Code
Brainstorming - Each group will get together at the beginning of the lab to discuss possible solutions, two of which will be handed in. For each solution, write a short paragraph explaining your approach (< 200 Words).

Pseudo Code - Each group must provide a step by step outline of the program their robot will follow. You are not required to give details of the implementation. For an example, check this page: [http://www.unf.edu/~broggio/cop2221/2221pseu.htm](http://www.unf.edu/~broggio/cop2221/2221pseu.htm)
Along with your pseudo-code, please create a flowchart diagram of your program. For an example of a flowchart, see this page: [http://en.wikipedia.org/wiki/Flowchart](http://en.wikipedia.org/wiki/Flowchart)

Demonstration
Marks on the demonstration section will be given according to a team’s rank after the round robin tournament. The first place team will receive 5/5, the second place team will receive 4, third place 3, and the remaining players will receive a mark between 0 and 2 based on merit.

Commented Code
This should be a copy of your actual code. Ensure that you comment your code thoroughly, explicitly defining all methods, tasks, variables and classes. Do not assume that your algorithms are clear to anyone reading the code for the first time.

Design Process
The first component of your write up is a discussion of your general approach to the assignment. Explain why you built like you did, why your program exhibited the behaviours it did, and which approaches you found successful. Be sure to justify any design decisions made, list any difficulties you encountered, and explain why your particular strategy is the best to handle the task.

Connections
This component of your write up should link what you have learned in the lab with material covered in lecture and assigned readings. Please cite your sources in APA.
You will be graded on both the creativity and the quality of the connections made. To find connections, think of some of the challenges you encountered while designing your robot.

Use the following questions to guide you:
- Are any of the challenges you faced related to existing conundrums in Cognitive Systems?
- Did you find any particular technique helpful when trying to get your NXT to complete the task? What does the relevant literature say about this technique?
- What constitutes intelligent behaviour and did your robot exhibit this?
- Did completing the lab project help you better understand any topics covered in lecture? What was the topic and how did it contribute?

Students are advised to pick one or two major connections and explore them in depth rather than identifying a large number of connections and discussing them superficially. Be ready to defend your choices!

**Style and Length**
We reserve the right to reduce up to 2 marks from overall grade due to error-prone writing that would impede understanding. Make sure to proofread your papers before submitting.

In addition, we will reduce marks for lab reports for which the written portion (Design Process + Connections) exceeds 2 pages, double-spaced.