CSCI 1106
Lecture 16

Robotics Project and Project Planning
Announcements

• Today’s Topics
  – The Project: Robot Olympics
  – Program Planning
  – Strategy
  – Tactics
Robot Olympics

• Consists of 3 events:
  – Marathon
  – Hurdles
  – Curling

• Your Group’s Tasks:
  – Write a program for each event
  – Try your strategy in the simulator
  – Compete in the Robot Olympics
  – Write a report on your project
General Rules

• One program per event
  – Programs cannot be changed once competition begins

• No human interference
  – You may not touch a robot while it is competing
  – Robots may be disqualified if interference occurs

• Robot’s performance affects your grades
  – See project specifications for rubric
Marathon

• As quickly as possible
  – Race on marathon track (3 tables)
  – Cross the line and Race back
  – Cross the Finish/Start line

• Robot has one 4-minute attempt
Hurdles

• Move from START to FINISH as quickly as possible
• Robot cannot dislodge objects, cross the center line, or leave arena
• Robot has three 2-minute attempts
Curling

- **Qualifier #1**
  - Robot must stop moving after 1 minute
  - Robot may not leave the arena

- **Qualifier #2**
  - Robot must end up within the outer ring within 60 seconds
  - Robot must be able to start from either START position

- **Competition**
  - Head-to-head double elimination
  - Robot closest to the center of the ring after 60 seconds wins
  - Starting position determined by coin toss
The Project Report

General Information
- Report is aimed at peers, TAs, & instructor
- 8 pages, 11pt (see template)
- The report must
  - Provide sufficient background
  - Describe the program design, strategy, and tactics
  - Justify your design decisions
  - Describe how successful the programs were
  - State overall conclusions
- Rubric in project specification

Recommended Structure
- Title and author information
- Abstract
- Introduction (goal, background, summary)
- Main Body
  - Outline of Strategies
  - Implementation
  - Simulation results
- Competition results
- Conclusions and Future Work
- References
Where Do We Start???

• **Situation:**
  – 5 Labs (+ overtime if need be)
  – 3 Programs
  – 1 Project Report
  – 4 to 5 group members
  – 1 Robot

• **Step 1: Identify the Tasks**
  – **Develop three programs**
  – Write a project report
Steps for Developing a Program

1. Develop program *strategy*
2. Identify *tactics* to implement the strategy
3. Model tactics with state transition diagrams
4. Implement program based on STDs
5. Test your program
6. Refine strategy and tactics as necessary
7. Repeat
Strategy

• How are we going to solve the problem?
  – Typically there is more than one way
  – Can be described in a couple sentences

• Example: Getting to class on time
  – Avoid the rush hour
  – Don’t drive
  – Live in residence

• Example: Preparing for exams
  – Study in advance
  – Cram the night before
Example: The Line Race

Strategies

• Go as quickly as possible, and pay the price of losing the line
• Go slow enough and never lose the line
Strategy (cont.)

• Should be able to describe the strategy in a couple of sentences
• Use one strategy per problem
• A strategy is implemented with tactics
  – Tasks
  – Ideas
  – Concepts
• Each part of the strategy must be implemented with one or more tactics
Tactics

• Tactics are how you implement the strategy

• Example: Cramming
  – Consume lots of sugar and caffeine
  – Play loud music
  – Tie yourself to your desk

• Example: Following the line at full speed
  – Implement a good recovery mechanism
  – Make sure your tires have good traction

• Tactics may be composed of multiple simpler tactics

• How do you put it all together?
Program Planning

• For each event formulate a strategy
  – Convince yourself that you can implement it
  – Identify the tactics you will need
• For each tactic
  – Design a state transition diagram
  – Design corresponding part of the program
• Put the parts together
• How much time will this take?
Project Management

• Determine amount of time to spend on each task:
  – Marathon
  – Hurdles
  – Curling
  – Project Report

• Note: former three can be done sequentially, the latter in parallel

• Divide up time among tasks: (example)
  – Marathon (1 lab period)
  – Hurdles (2 lab periods)
  – Curling (2 lab periods)
  – Project report (homework)

• Notes:
  – Be prepared to adjust your time estimates as the project evolves
  – Group communication and management is very important!
Deliverables

• Three Programs
  – Loaded on your robot to compete in the Robot Olympics.
  – These files must be submitted to prof1106@cs.dal.ca before your presentation period (use subject line “Lab x Group y”) where x and y are the corresponding numbers

• Technical Report
  – Maximum 8 pages
  – Hard copy in class on December 7