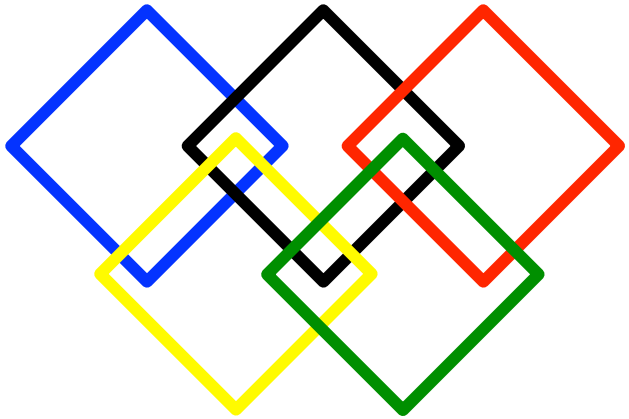


CSCI 1106
Lecture 16

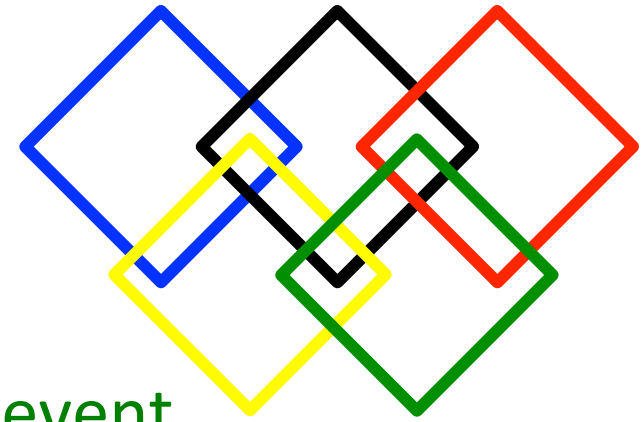
Robotics Project and Project Planning

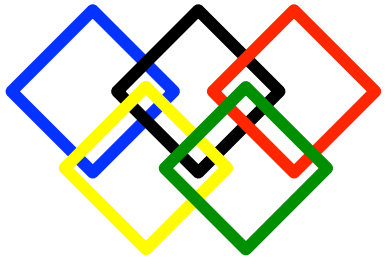
Announcements

- 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



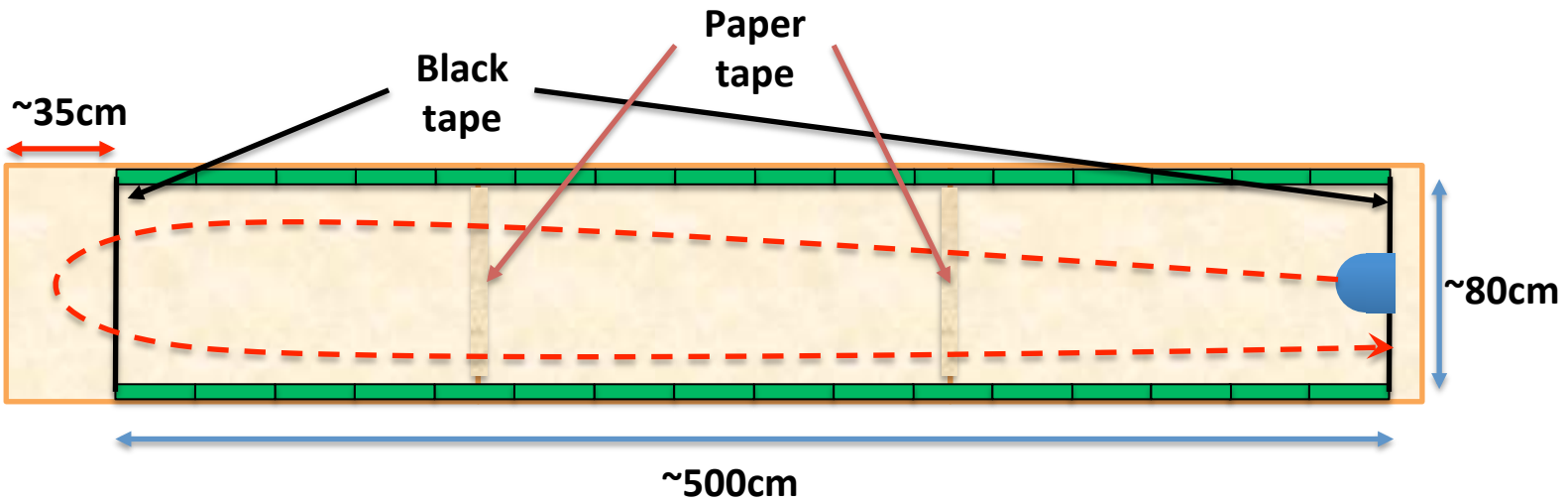


General Rules

- 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

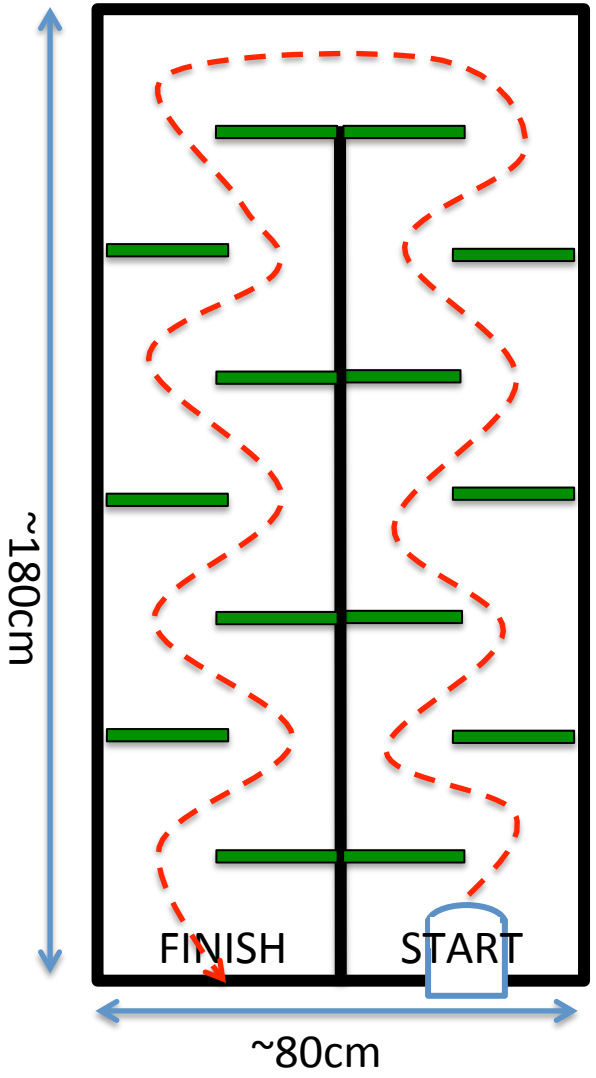
Marathon

- 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



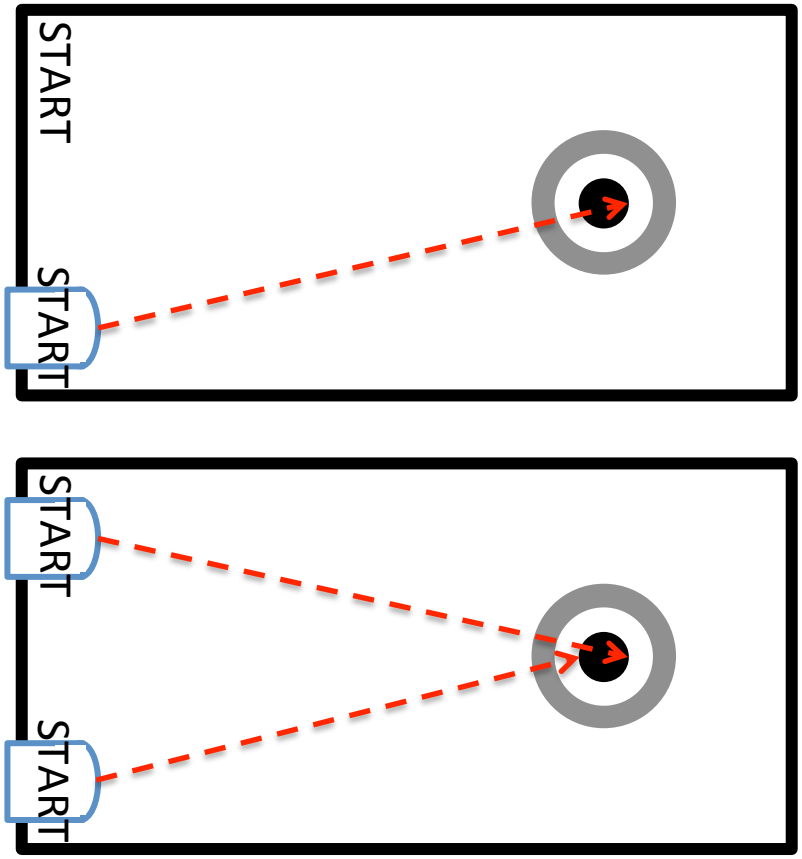
Hurdles

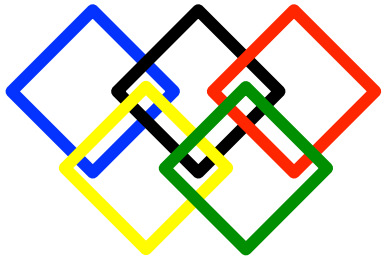
- Move from START to FINISH as quickly as possible
- Robot cannot dislodge objects, cross the center line, or leave arena
- Robot has three 2-minute attempts



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

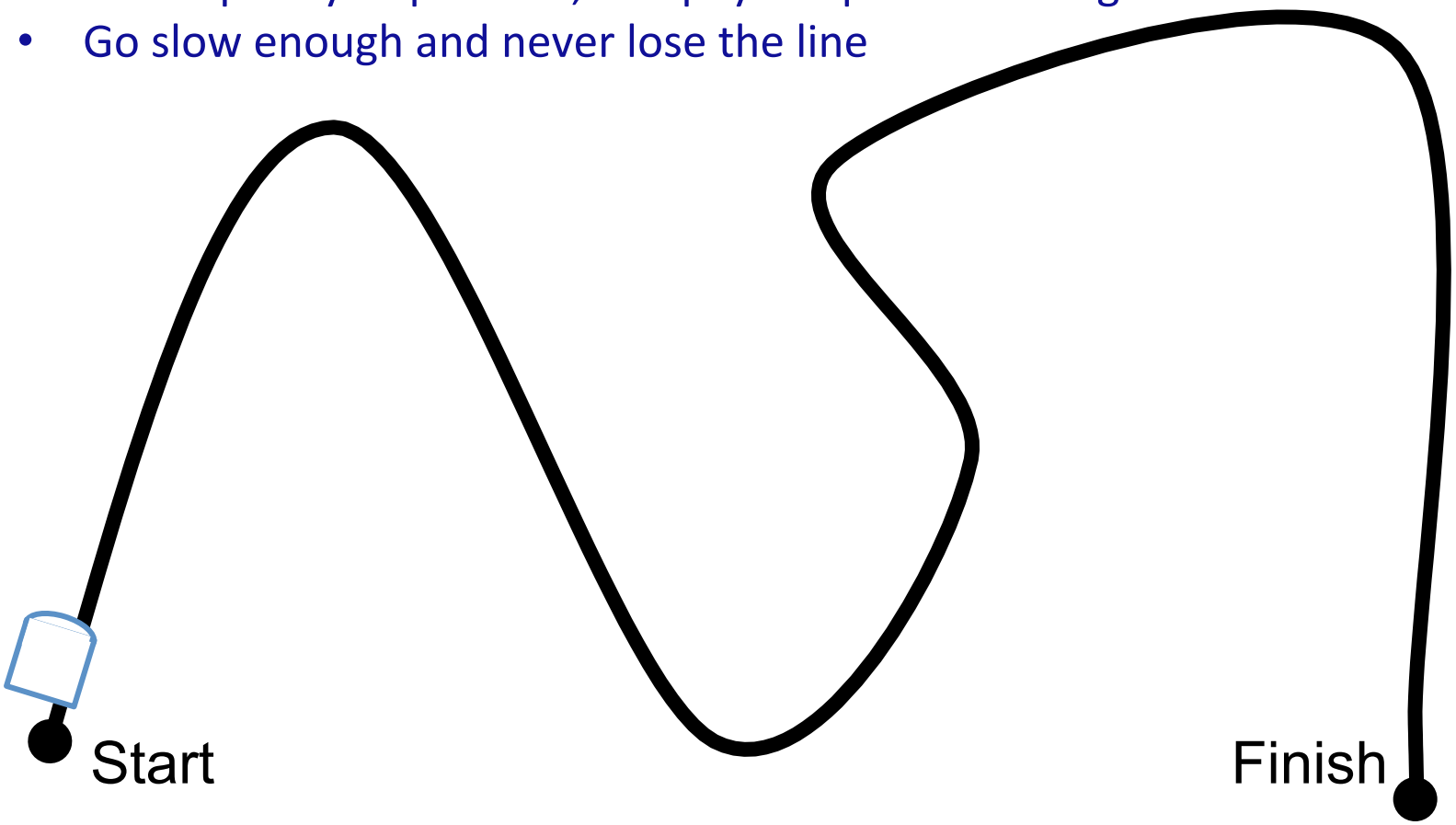
Strategy

- 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.)

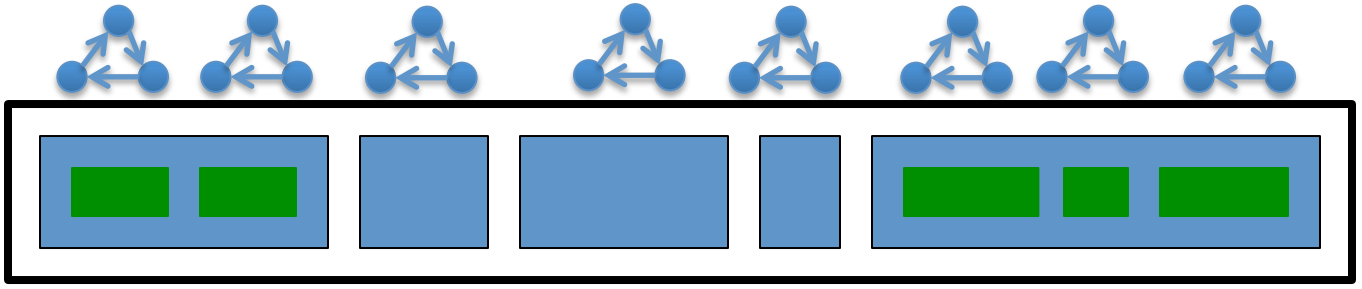
- Should be able to describe the strategy in a couple of sentences
- Use one strategy per problem
- A strategy is implemented with *tactics*
  - Tasks
  - Ideas
  - Concepts
- Each part of the strategy must be implemented with one or more tactics

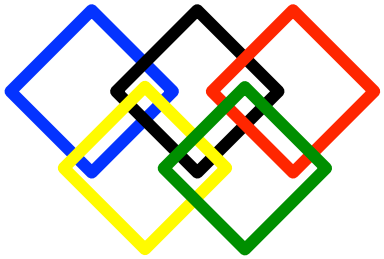
Tactics

- 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**