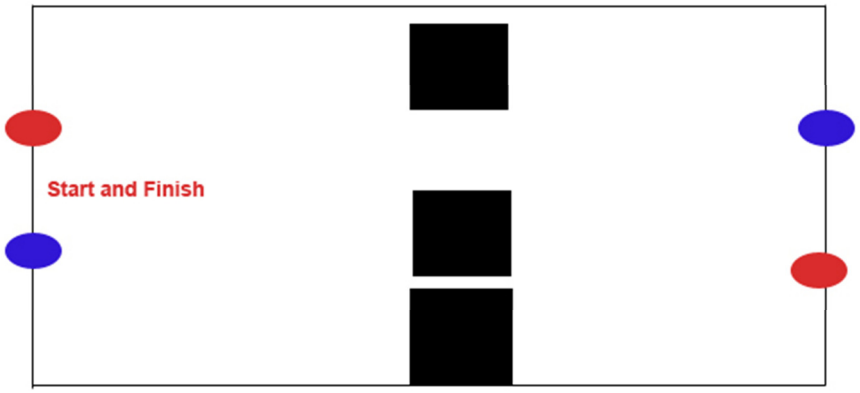
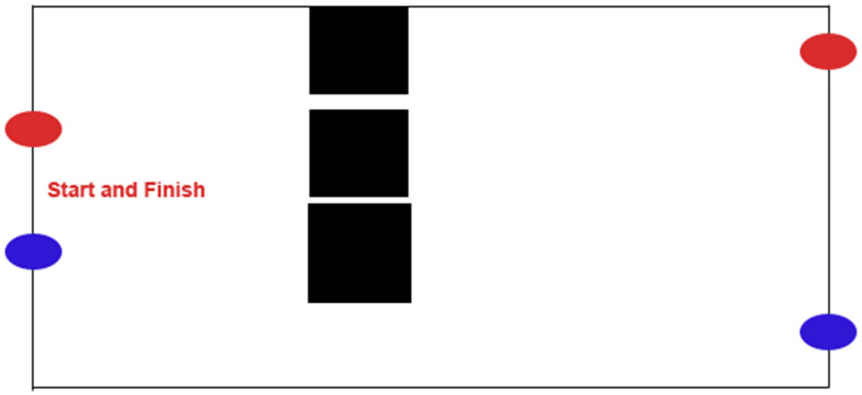
CS245 – Robotics and Machine Learning
Lab 4
Navigate the Terrain

The purposes of this lab are to utilize different types of sensors (e.g., ultrasonic, touch, and optical), to utilize knowledge about the environment, and to use robots for detection and avoidance of real-world objects

We will make an area for this lab exercise in our classroom, consisting of side "borders" and a "wall" of obstacles that will be placed randomly on the course. The borders will be in black and about an inch wide. The wall will contain a single opening through which your robot will be able to pass to the other side. At the two opposite sides of the area, there will be two circles of two different colors. Your robot will start on a circle of a specific color; it then must navigate through the obstacle wall to the opposite side of the course. After that, your robot must seek and find the circle with the same color as the circle on which it started on the other side of the course. These two circles will be placed randomly on the border line. Your robot must indicate that it has found the circle of the correct color. After that, your robot must turn around and go back to the beginning and find the circle on which it started. Your robot must indicate that it has completed the task.

Some examples of two different area configurations are shown below:





The course will be approximately 10-15 feet long, and about 3-5 feet wide. The surface on which the robot will navigate will be the floor in our classroom.

There will be a time limit of 2 minutes for a successful completion of this task.

Lab Report

Each student should describe, in detail, the process of designing the programs to manipulate your robot for the above tasks. In particular, please describe the following in your report:

- Any physical changes to your robot design for the tasks above
- Designs of your programs in plain language
- Challenges you encountered and how you coped with them
- Observations of the performance of your robot's sensors and effectors

Your report should be between 2 and 3 pages long, single-spaced, in Times New Roman 12 point font. Please turn in your program electronically via email.

The grade for this lab will be determined according to the following:

- Successful completion of Tasks above (65%)
- Lab Report :
    - Overall quality (10%)
    - Design process and challenges (10%)
    - The program (10%)
    - Sensor/effector performance (5%)

Demonstrations and evaluations of your work for this lab will take place on November 2nd during the lab period. Lab reports are due on Monday November 5th before the beginning of the class period. Late submissions of lab reports only will be accepted for 24 hours after the due date and time and will carry a penalty of 50% reduction in the lab grade. No assignments or lab reports will be accepted after the expiry of the 24 hour extension period.