

How We Got Chocolate

16-311 Lab 10

Backstory

(How We Chose It)

Once upon a time, in a not so far away place, Howie arrived home and decided to eat some delicious chocolate. But alas, although he searched high and low, there was no chocolate to be found 😞 (perhaps his kids are too good at hiding their Halloween candy nowadays).

Only you, brave adventurer(s), with your knowledge of Legos, Python, and assorted other talents, will be able to deliver Howie's much-needed sweets in a timely fashion.

If you are able to complete this quest autonomously, you will win Howie's undying gratitude, and a little chocolate to keep (oh and maybe 100 on the final but that's a tale for another day...).

— — —

Learning Goals

— — —

- Make a robot that uses sensors.
- Use odometry to turn 90 degrees (maybe).
- Pick up and place an object in a certain location.
- Complete requirements within a specific time limit.

Demo Goals

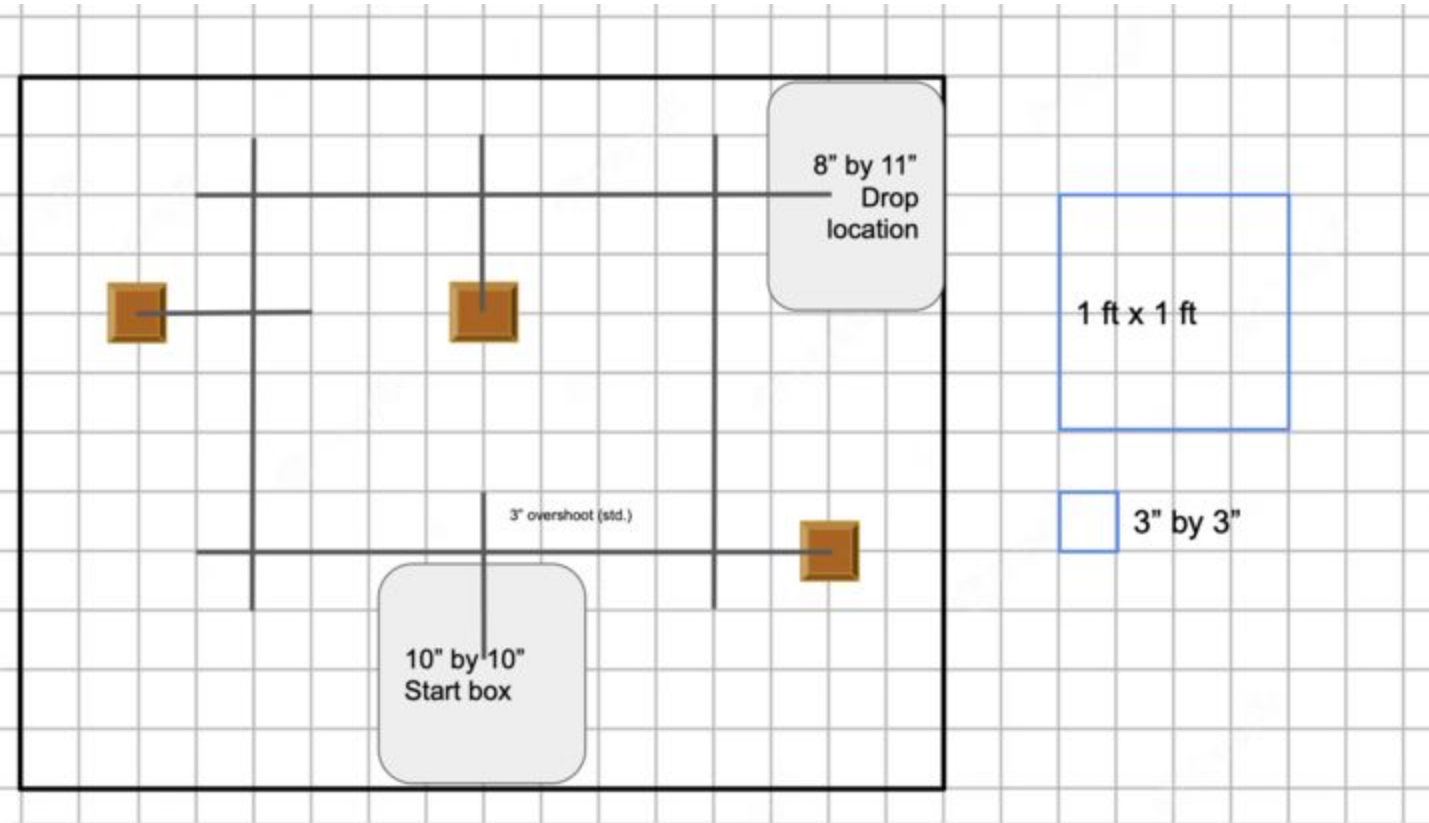
- Follow line path to destination (Howie) and pick up and drop as many chocolates to the destination as possible
 - “Chocolates” are blocks that will be on the side of the path to pick up
- Drop of at least 2 chocolates for full points
- Two minutes to complete the task
- Completely autonomous

Demo Definitions:

— — —

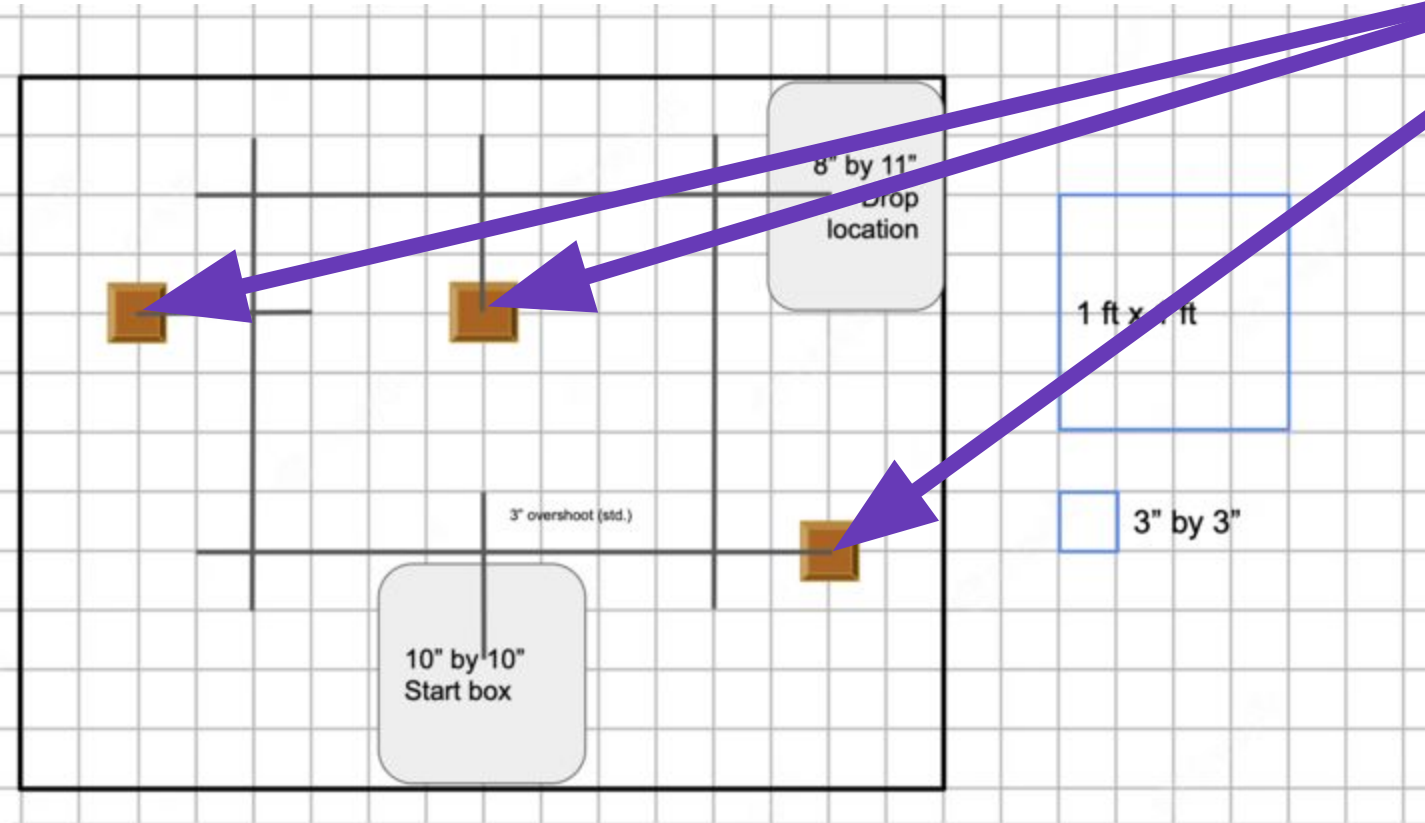
- **Visiting goal:** robot must drive on to the path segment that connects the dropoff box with the rest of the course.
- **Contact:** robot must be in contact with the block continuously for at least 2 seconds.
- **Pick Up:** robot must either lift the block off the ground for at least 2 seconds or move the block with the robot for at least 2 inches.
- **Delivery:** robot must drop off the block inside the goal box on the course.

Demo Field Breakdown



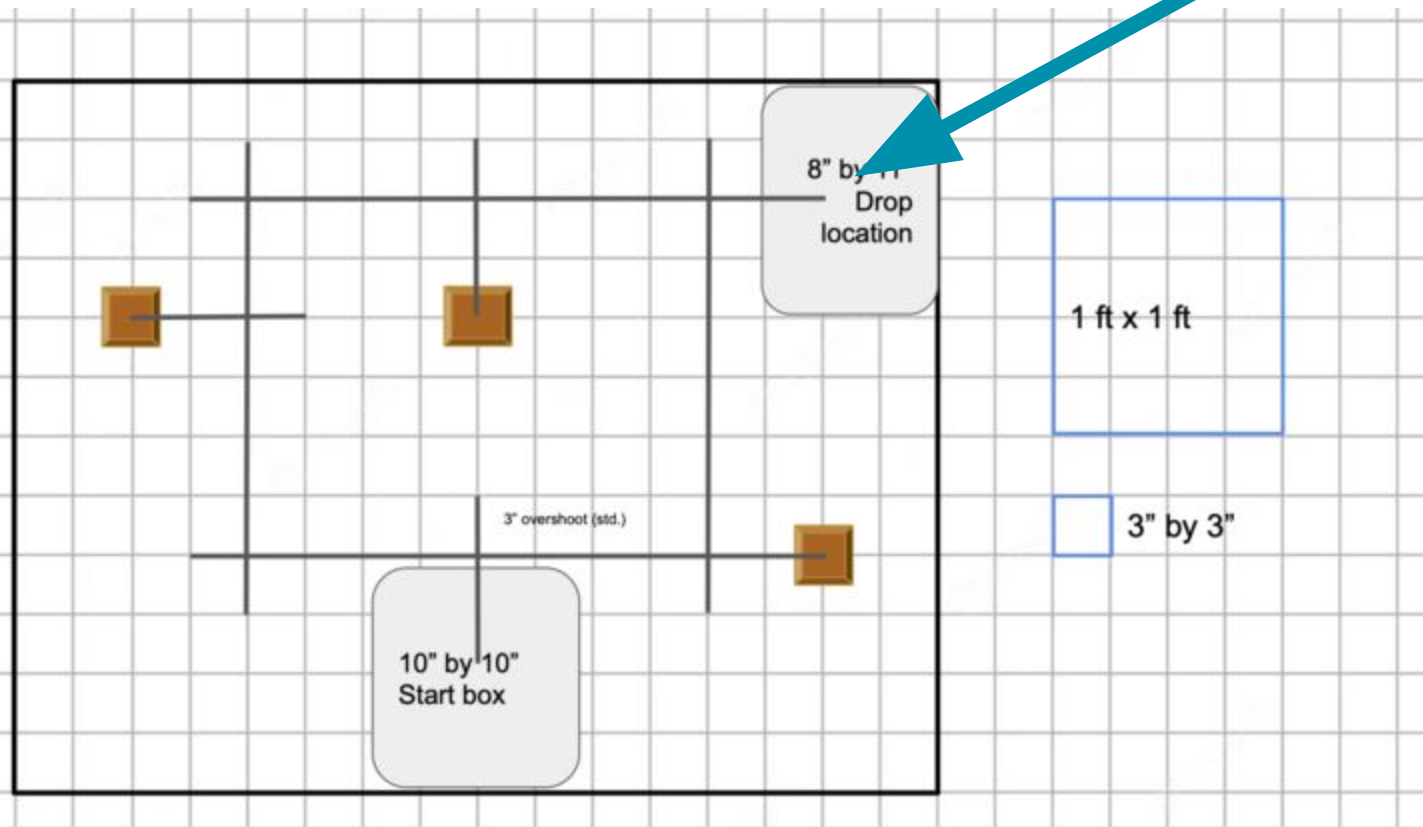
Field Breakdown

Chocolates



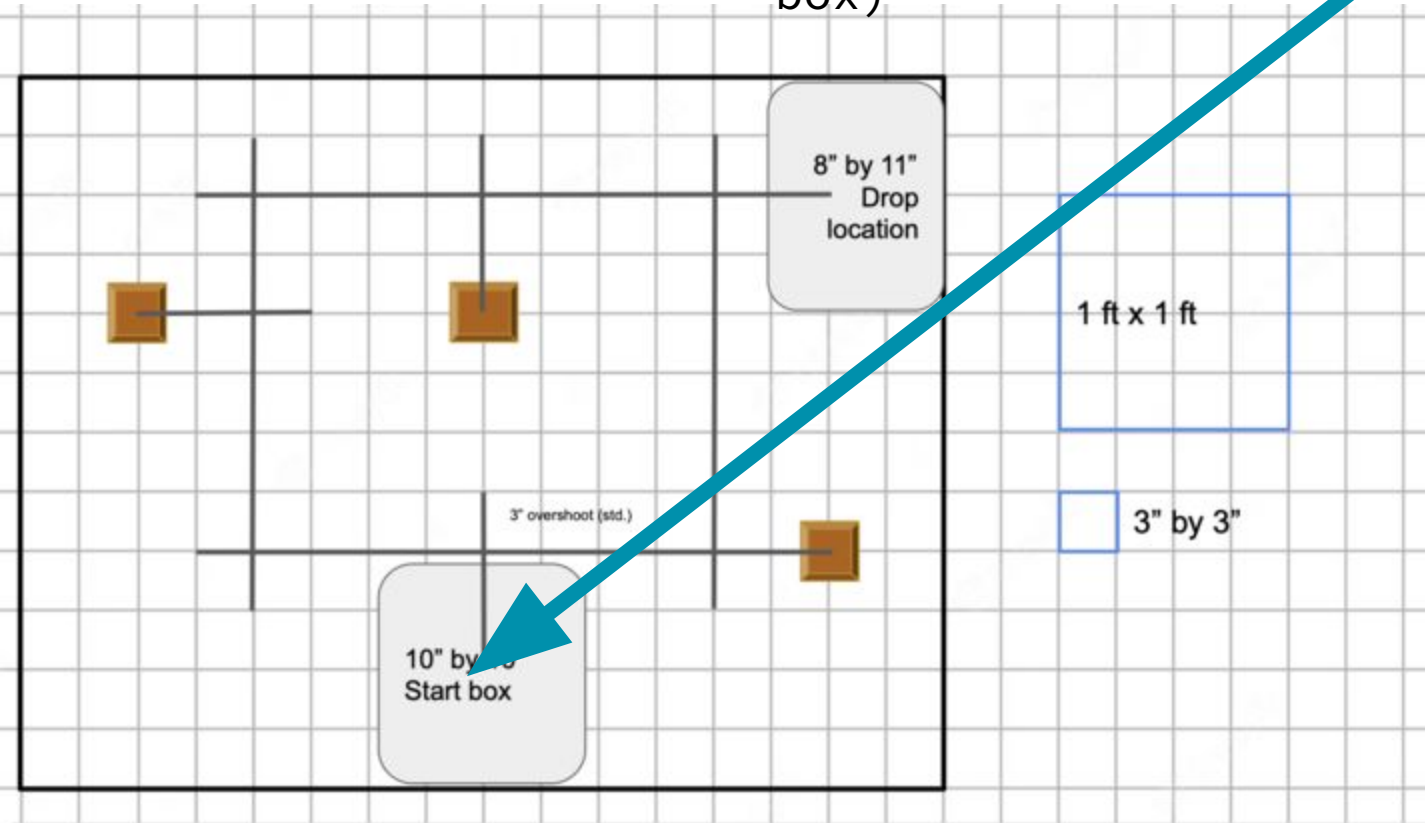
Field Breakdown

Howie

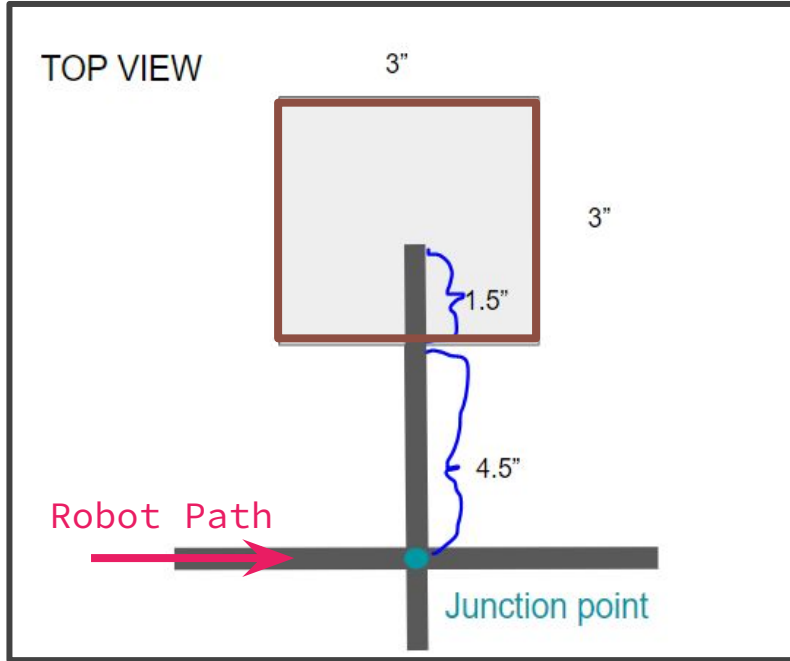


Field Breakdown

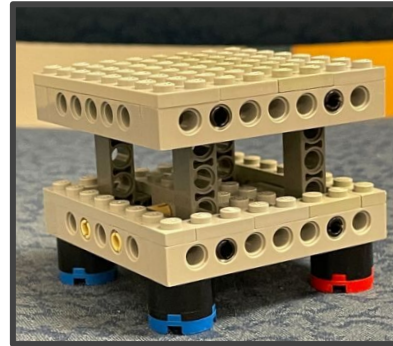
Starting Position (Placed by Student)
(Any part of Robot cannot leave the box)



Pickup location



- The object pickup location will start 4.5" away from junction point
- The black line will end 1.5" into the pickup location



Chocolate Game Piece

- 2.5"x2.5"

Requirements

— — —

- Sizing: The Robot must smaller that 10"x10"x12"
 - We will use a box to measure it. Make sure the robot fit in the box.
 - The base of the robot is recommended to be no larger than 8"x 9"x9".
- Timing: For Demo run, we will time 120 seconds. Any robot action past 120 mark will not count for the scoring.
- Timing starts when robot starts moving.

Demo Grading

- Q&A - 15 points
- Demo - 85 points
 - Show you can deliver chocolates to Howie!
- Total → 100 points
 - 115 points available (demo goes up to 100 points)
- Best of 2 trials

Demo Point Breakdown

— — —

- **Visit Howie - 20 points**
- **Contact - 15 points**
 - 1st chocolate: 10 pts
 - 2nd chocolate: 5 pts
 - 3rd chocolate: 5 pts
- **Pick up - 20 points**
 - 1st chocolate: 15 pts
 - 2nd chocolate: 5 pts
 - 3rd chocolate: 5 pts
- **Delivery - 30 points**
 - 1st chocolate: 20 pts
 - 2nd chocolate: 10 pts
 - 3rd chocolate: 5 pts

Total number of points capped to 100 for the entire lab.
Higher priority given to first two chocolates.

Demo Time Breakdown

— — —

- 1 min prep
- 4 min for demo
 - 2 min per trial
- 3 min Q&A

Q & A

— — —

- Questions can be on robot structure, algorithms used in the code, etc.
- (bribe with promises of chocolate?)
- 3 total, 5 point each, 1 question per person

Video

— — —

- Submit video link by Tuesday, April 25 11:59pm
 - Form will be out later on Piazza
- Show timer and measure robot

Competition!!!

— — —

- Top 8 teams will compete on **Wednesday, April 27 during class.**
 - Any points you gain from the third chocolate will be used to help break ties to enter competition
- Two maps will be put side by side
 - First team to get more chocolates to their destination before time runs out wins
 - Tie breakers based on time and then class vote
- Winner of competition gets a 100 on the final

Tips & Tricks

— — —

Line Following Tips:

- Consider how you can use two light sensors to know where you are on the path and if a certain path takes you to the chocolate
- Consider how the design of your robot (wheel size, weight, width) affects the accuracy of your odometry.

General Tips:

- Remember this is all autonomous. Test a lot!!