**Slide 1: Demo 1 Presentation (Bailey)**

Hello! We are SEED Lab Group 4, also known as Lightning McSEED and this is our presentation introducing the final project, as well as our work for Demo 1!

**Slide 2: Final Objectives (JORDIE)**

The objective of this course is to create a robot that will use a Raspberry PI and an Arduino in order to “visualize” an obstacle and move around it using ArUco markers. The image on the screen now similar to a QR code is an ArUco marker, and the Raspberry PI will use a camera in order to see these markers and move according to their location compared to the robot.

This obstacle course is designed to replicate a search and rescue zone, and our robots are meant to circle the perimeter of this zone.

**Slide 3: Example of final course (DAXTON)**

In this example course, the greyed-out region is the unknown area, with 6 markers along the outside. Hopefully, our robot will use these markers and their location as a way of directions and move along the outline of the unknown area, not to be more than 1.5 feet away from it.

**Slide 4: Meet the team**

BAILEY: My name is Bailey Oteri, and my main objective was system integration and communications between the Raspberry PI and Arduino.

JORDIE: My name is Jordie Weber, and my main objective was computer vision, where I used the camera attached to the Raspberry PI to determine the location of ArUco markers.

TREVOR: My name is Trevor Wolf, and my main objective was Localization on the Arduino. \*\*ADD\*\*

DAXTON: My name is Daxton Garner, and my main objective was Control of the Arduino and did the necessary work in Simulink and MATLAB. \*\*check\*\*

**Slide 5: Meet our robot! (DAXTON)**

This is the final design for our robot for Demo 1!

**Slide 6: Hardware Design (TREVOR)**

Demo 1 requires translation and rotation, so the robot was constructed to be as wide as it could be in order to increase rotational accuracy. A wider robot means each wheel traverses a greater distance to rotate the robot, increasing accuracy when requested to turn a certain radius.

For our final robot we will be making some adjustments as we see fit, and most likely having a more slim design in order to easily stay within the 1.5 foot radius around the obstacle.

**Slide 7: How we Detect ArUco Markers (JORDIE)**

Our Raspberry PI used a camera to detect where the ArUco markers were. It then uses trigonometry functions to find the angle between the current path of the robot and the marker to determine if the robot needs to turn.

The PI will then send this information to the Arduino using I2C communication.

The PI is also using I2C to print to the LCD screen on top of the PI

**Slide 8: How Arduino Control Robot (DAXTON)**

Each rotor has its own PI control loop. These move each wheel to a target position. When moving forward, both positions are the same. When rotating, one target is the negative of the other, so the robot rotates instead of translating.

**Slide 9: Project Timeline (BAILEY)**

This is the timeline of our project from start to finish. In order to properly understand all of our subsystems, we started with two individual assignments. We then combined everything in a mini-demo and are now on Demo 1. For this demo, Trevor and Daxton had to get the robot to rotate a specified radius, then move forward a specified distance. Bailey and Jordie had to get the Raspberry PI to find the angle between the camera and an ArUco marker.

**Slide 10: ?**

Thank you for watching our presentation!