About the Program

This API utilizes the Flask web framework, as well as two pre-built Motor and Robot classes, to allow a tank robot to perform various tasks based on user input. The tank robot has a Raspberry Pi 3b+ processor.

The API will allow users to control the tank robot remotely by entering a specific URL into any browser from any computer, as long as the robot is turned on. The user will be able to move the robot forward or backward by a specified length, or turn the robot left or right by a specified angle measure. If the user is unsure of what they want to do, the robot has a built-in "run" feature that will allow the robot to traverse a set maze.

See our table of contents to skip to whichever step necessary:

Installation

Note: If Pip and Flask are already installed, skip to the next section to learn how to run the program.

Install Pip:

First, before installing Flask, users must install Pip if it is not already installed. Connect the device to a stable internet connection and enter this command into the terminal:

```
sudo apt-get install python-pip
```

Install Flask:

Once Pip has been installed, the users can install Flask by entering the following command into the terminal:

```
sudo pip install flask
```

This will allow the users to successfully use our API.

Running the Program

In order to run the program, the users must first connect to the robot using SSH. They can do this by entering the following command into the terminal:

```
ssh pi@192.168.1.243
```

Once they complete this step, they will be able to run the program by running the command:

```
python app.py
```

This will create the Flask server, which will then allow the users to run the robot from **any device** (that is connected to the same WiFi as the device originally used to connect to the robot is). The users can run the robot from their chosen computer by choosing **any browser** and entering the following URL:

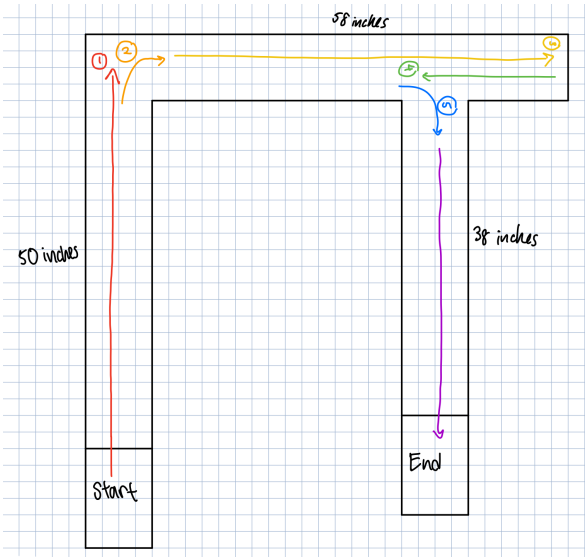
```
http://192.168.1.243:7777/
```

Following this URL, the users can enter specific commands that will allow the robot to either move forward or backward for a specified distance, turn right or left at a specified angle, or complete the default maze.

Executing Specific Commands

Running the Default Maze:

The default maze that the robot will run requires it to move forward 50 inches, turn right 90 degrees, move forward 58 inches, move 2 feet backwards, turn right, and move forward 38 inches. The robot will start in a box and end in another box, so this will be accounted for in the distance the robot will move. To visualize the maze, here is a diagram of the robot's route:



The URL that will run this maze when typed into any browser is as follows:

```
http://192.168.1.243:7777/run
```

Moving Forward:

This API allows the robot to move forward a specific distance (in feet) based on the user's input. Type the following URL into any browser to move the robot forward 1 foot:

```
http://192.168.1.243:7777/fwd?d=1
```

The users can set "d" to whatever distance, in feet, they want the robot to move. The default distance (without the user inputting anything) is 1 foot.

Moving Backward:

This API also allows the robot to move backward a specific distance (in feet) based on the user's input. Type the following URL into any browser to move the robot backward 1 foot:

```
http://192.168.1.243:7777/bwd?d=1
```

The users can set “d” to whatever distance, in feet, they want the robot to move. The default distance (without the user inputting anything) is 1 foot.

Turning Left:

This API will allow the robot to turn left at any specified angle (in degrees). The command that will allow the robot to turn left by 90 degrees is as follows:

```
http://192.168.1.243:7777/left?a=90
```

Again, the users can set “a” to whatever angle measure they desire. The default angle is 90 degrees.

Turning Right:

This API will also allow the robot to turn right at any specified angle (in degrees). The command that will allow the robot to turn right by 90 degrees is as follows:

```
http://192.168.1.243:7777/right?a=90
```

The users can set “a” to whatever angle measure they desire. The default angle is 90 degrees.