CSCE 274 - Section 01 - Fall 2017 - Project 2 - Khalid Salah, Logan Fisher, Julian Hong

Lab Report Project 3

**Description:**

The purpose of this project was to have the iRobot use it’s IR sensors to follow a wall and make turns when it comes to corners by implementing a PD controller. The robot, when set next to a wall, is supposed to begin running when the clean button is pressed. Then it is supposed to begin driving straight next to the wall, keeping a certain distance away, making sure not to be too far or too close to the wall. When the robot approaches a wall, it is supposed to turn along with the wall. The robot is also supposed to make appropriate actions when it’s bump sensors are activated

We used the same dependency files from project 1 and 2, Linguist.py and Jaguar.py. Linguist.py, our serial communication interface, is used to to handle raw communication between the physical iRobot and the robot action interface. Jaguar.py was created to handle the actions of the robot and serves as the action interface. Our serial communication interface was left untouched as no changes were needed. Our robot action interface did need some additional functionality added to it. We added a function that processed and returned data from the center right and right IR sensors. This data is used by the PD controller in the main program.

Our main file, TheWall.py, has a thread to drive straight, a thread to listen for bumps, a thread for handling button clicks, and our newest thread that implements a PD controller that makes adjustments to the speed. The PD controller allows the robot to follow the wall and stay on course. The standard PD equation was used. An output was calculated by multiplying a proportional gain by the last error and adding that to the derivation gain multiplied by the difference between the last error and the error before it divided by the time between readings. Values for the setpoint, proportional gain, and derivative gain were experimentally selected until values that allowed our robot to work successfully were found.

Evaluation:

The robot works as it is expected to. When the clean button is toggled, the robot begins following the wall. It collects data from the IR sensors, calculates an output from the PD controller, and then makes adjustments to its left and right wheel speeds. It looks as though it is driving straight, but in reality it is slightly turning to the left and right every 0.2 seconds. It’s beautiful. When the wall turns, the robot also turns with the wall and stays on track. In the rare chance that it does hit, the robot slightly backs up and gets back on track immediately.

Allocation of Effort:

Khalid Salah:

* Debugged Scout.py
* Established KP and KD
* Assisted with PD controller
* Testing

Logan Fisher:

* Implemented PD Controller
* Debugged Scout.py
* Wrote IR sensor functions

Julian Hong:

* Wrote Report
* Debugged Scout.py
* Assisted with PD controller thread
* Testing