**Homework – Obstacle Avoidance and Maze**

1. In lab, you demonstrated bang-bang and PID obstacle avoidance using an ultrasonic sensor mounted on the Domabot’s bow. Complete the following table (20-points total)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Trial | speedBase | oObst | [oKp, oKi, oKd] | YouTube URL | Observations |
| A | 50 | 30 | [0, 0, 0] |  |  |
| B | 50 | 30 | [20, 0.01, 0.5] |  |  |
| C | 30 | 30 | [0, 0, 0] |  |  |
| D | 30 | 30 | [20, 0.01, 0.5] |  |  |

1. One must tune 2 sets of PID gains for the Domabot to successfully navigate a maze. The first set is for (port-side) wall-following (WF). The second set is for bow-side obstacle avoidance (OA) for right turns. Additionally, one can turn the Domabot’s base speed.
2. Provide 3 URLs to your YouTube videos showing at least one successful run. The other 2 videos can be failed runs (30-points)
3. Provide the WF and OA PID gains and base speed for each run (15-points)
4. Comment on how you observed failed runs to tune the gains and base speed for the successful run (15-points)
5. In lab, the Technic, Axle Connector Double – Flexible Rubber (#45590) was introduced. Because it’s flexible, a small motorized prop can fit inside it. If mounted on the Domabot, the motorized prop could blow out candles in front (bow-side) of the robot. In Studio construct a step-by-step build plan and BOM for a mount that attaches to the Domabot (10-points). Physically construct the mount and provide a photo of it attached to your Domabot (10-points) – if you don’t have 45590, don’t worry about it for the photo; the photo should show that it would allow the motorized prop to blow out candles that are in the front of the Domabot. (Grand total = 10+10 = 20-points)