

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]		

2. 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.
- A. Provide 3 URLs to your YouTube videos showing at least one successful run. The other 2 videos can be failed runs (30-points)
 - B. Provide the WF and OA PID gains and base speed for each run (15-points)
 - C. Comment on how you observed failed runs to tune the gains and base speed for the successful run (15-points)
3. 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)