

Result till 9 Jan 2023

	Noise	Test Iterations (100)				Test Iterations (1000)				File saved
		Succe ss Rate	Collisio n Rate	Me an Dis t	Ima ge id	Succe ss Rate	Collisi on Rate	Mean Dist	Image Id	
Base Model	0	74	26	N/A	1	69.70	30.20	0.30	2	v1.zip
		75	25	N/A	3	69.70	30.30	N/A	4	v1_1000000_step s.zip
Noisy Model	0.01	77	23	N/A	5	69.80	30.20	N/A	6	v5_2d_noise_0.01
	0.1	51	29	0.77	7	54	31.50	0.86	8	v5_2d_noise_0.1
LPF	0.1, alpha=0.1	31	69	N/A	9	39.40	60.60	N/A	10	v6_lpf_0.1_exp_avg_alpha=0.1
	0.1, alpha=0.3	64	36	N/A	11	62.40	37.60	N/A	12	v6_lpf_0.1_exp_avg
Kalman Filter	0.1 measurement noise +0.01 process noise	63	37	N/A	13	60.60	39.40	N/A	14	v6_kf
		50	50	N/A	15	64.80	35.20	N/A	16	v6_kf_not_so_good
		60	40	N/A	17 (seed 5)	64.10	35.90	N/A	18 (seed 5)	

Note: KF with 0.1 measurement noise and 0.01 process noise is giving 60,40 result with random seed(5) model name: v6_kf_not_so_good [17] image

Images:

Image Id	Image
1	<pre>(rl) bhaskar.joshi@gnode060 ~/DroneControl/SBAgent ? noise ± python EvaluateModel.py pybullet build time: May 20 2022 19:45:31 Config Data: Namespace(xmin=0, xmax=2, ymin=-0.5, ymax=0.5, zmin=0, zmax=1, useSafetyBounds=True, minObstacles=0, maxObstacles=4, randomizeObstaclesEveryEpisode=True, assistLearning=False, lenientUntil=100000, fixedAltitude=True, episodeLength=1000, showGeoFence=True, showTrajectory=True, showProximityLines=True, randomizeDronePosition=False, randomizeTargetPosition=False, freq=240, aggregatePhysStep=5, noise=False, mean=0, std_dev=0.1, denoiser='None', measurement_noise=0.1) [INFO] BaseAviary.__init__() loaded parameters from the drone's .urdf: [INFO] m 0.027000, L 0.039700, [INFO] lxx 0.000014, lyy 0.000014, lzz 0.000022, [INFO] kf 0.000000, km 0.000000, [INFO] t2w 2.250000, max_speed_kmh 30.000000, [INFO] gnd_eff_coeff 11.368590, prop_radius 0.023135, [INFO] drag_xy_coeff 0.000001, drag_z_coeff 0.000001, [INFO] dw_coeff_1 2.267.180000, dw_coeff_2 0.160000, dw_coeff_3 -0.110000 /home2/bhaskar.joshi/miniconda3/envs/rl/lib/python3.9/site-packages/gym/spaces/box.py:73: UserWarning: WARN: Box bound precision lowered by casting to float32 logger.warn(models/ppo_v1 100% 100/100 [00:55<00:00, 1.79it/s] ----- EVALUATION STATISTICS Success Rate: 74.00% Collision Rate: 26.00% Mean Distance to Target: N/A Mean Reward: 391.23 Minimum Reward: -1614.08 Maximum Reward: 1139.46 Mean Episode Duration: 256.38 steps Shortest Episode: 1 steps Longest Episode: 786 steps -----</pre>
2	<pre>(rl) bhaskar.joshi@gnode060 ~/DroneControl/SBAgent ? noise ± python EvaluateModel.py pybullet build time: May 20 2022 19:45:31 Config Data: Namespace(xmin=0, xmax=2, ymin=-0.5, ymax=0.5, zmin=0, zmax=1, useSafetyBounds=True, minObstacles=0, maxObstacles=4, randomizeObstaclesEveryEpisode=True, assistLearning=False, lenientUntil=100000, fixedAltitude=True, episodeLength=1000, showGeoFence=True, showTrajectory=True, showProximityLines=True, randomizeDronePosition=False, randomizeTargetPosition=False, freq=240, aggregatePhysStep=5, noise=False, mean=0, std_dev=0.1, denoiser='None', measurement_noise=0.1) [INFO] BaseAviary.__init__() loaded parameters from the drone's .urdf: [INFO] m 0.027000, L 0.039700, [INFO] lxx 0.000014, lyy 0.000014, lzz 0.000022, [INFO] kf 0.000000, km 0.000000, [INFO] t2w 2.250000, max_speed_kmh 30.000000, [INFO] gnd_eff_coeff 11.368590, prop_radius 0.023135, [INFO] drag_xy_coeff 0.000001, drag_z_coeff 0.000001, [INFO] dw_coeff_1 2.267.180000, dw_coeff_2 0.160000, dw_coeff_3 -0.110000 /home2/bhaskar.joshi/miniconda3/envs/rl/lib/python3.9/site-packages/gym/spaces/box.py:73: UserWarning: WARN: Box bound precision lowered by casting to float32 logger.warn(models/ppo_v1 100% 1000/1000 [08:14<00:00, 2.02it/s] ----- EVALUATION STATISTICS Success Rate: 69.70% Collision Rate: 30.20% Mean Distance to Target: 0.30 Mean Reward: 377.18 Minimum Reward: -1798.77 Maximum Reward: 2881.65 Mean Episode Duration: 261.63 steps Shortest Episode: 1 steps Longest Episode: 1000 steps -----</pre>
3	<pre>(rl) bhaskar.joshi@gnode060 ~/DroneControl/SBAgent ? noise ± python EvaluateModel.py pybullet build time: May 20 2022 19:45:31 Config Data: Namespace(xmin=0, xmax=2, ymin=-0.5, ymax=0.5, zmin=0, zmax=1, useSafetyBounds=True, minObstacles=0, maxObstacles=4, randomizeObstaclesEveryEpisode=True, assistLearning=False, lenientUntil=100000, fixedAltitude=True, episodeLength=1000, showGeoFence=True, showTrajectory=True, showProximityLines=True, randomizeDronePosition=False, randomizeTargetPosition=False, freq=240, aggregatePhysStep=5, noise=False, mean=0, std_dev=0.1, denoiser='None', measurement_noise=0.1) [INFO] BaseAviary.__init__() loaded parameters from the drone's .urdf: [INFO] m 0.027000, L 0.039700, [INFO] lxx 0.000014, lyy 0.000014, lzz 0.000022, [INFO] kf 0.000000, km 0.000000, [INFO] t2w 2.250000, max_speed_kmh 30.000000, [INFO] gnd_eff_coeff 11.368590, prop_radius 0.023135, [INFO] drag_xy_coeff 0.000001, drag_z_coeff 0.000001, [INFO] dw_coeff_1 2.267.180000, dw_coeff_2 0.160000, dw_coeff_3 -0.110000 /home2/bhaskar.joshi/miniconda3/envs/rl/lib/python3.9/site-packages/gym/spaces/box.py:73: UserWarning: WARN: Box bound precision lowered by casting to float32 logger.warn(models/ppo_v1 10M 100% 100/100 [00:49<00:00, 2.01it/s] ----- EVALUATION STATISTICS Success Rate: 75.00% Collision Rate: 25.00% Mean Distance to Target: N/A Mean Reward: 384.62 Minimum Reward: -1677.20 Maximum Reward: 1148.41 Mean Episode Duration: 260.92 steps Shortest Episode: 1 steps Longest Episode: 802 steps -----</pre>

4

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(rl) bhaskar.josh@gnode060 ~/DroneControl/SBAgent ? noise ± python EvaluateModel.py
pybullet build time: May 20 2022 19:45:31
Config Data: Namespace(xmin=0, xmax=2, ymin=-0.5, ymax=0.5, zmin=0, zmax=1, useSafetyBounds=True, minObstacles=0, maxObstacles=4, randomizeObstaclesEveryEpis
ode=True, assistLearning=False, lenientUntil=100000, fixedAltitude=True, episodeLength=1000, showGeoFence=True, showTrajectory=True, showProximityLines=True,
randomizeDronePosition=False, randomizeTargetPosition=False, freq=240, aggregatePhysStep=5, noise=False, mean=0, std_dev=0.1, denoiser='None', measurement_nois
e=0.1)
[INFO] BaseAviary.__init__() loaded parameters from the drone's .urdf:
[INFO] m 0.027000, L 0.039700,
[INFO] lxx 0.000014, lyy 0.000014, lzz 0.000022,
[INFO] kf 0.000000, km 0.000000,
[INFO] t2w 2.250000, max_speed_kmh 30.000000,
[INFO] gnd_eff_coeff 11.368590, prop_radius 0.023135,
[INFO] drag_xy_coeff 0.000001, drag_z_coeff 0.000001,
[INFO] dw_coeff_1 2267.180000, dw_coeff_2 0.160000, dw_coeff_3 -0.110000
/home2/bhaskar.joshi/miniconda3/envs/rl/lib/python3.9/site-packages/gym/spaces/box.py:73: UserWarning: WARN: Box bound precision lowered by casting to float32
logger.warn(
models/ppo v1 10M
100% | 1000/1000 [08:10<00:00, 2.04it/s]

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EVALUATION STATISTICS
Success Rate: 69.70%
Collision Rate: 30.30%
Mean Distance to Target: N/A
Mean Reward: 371.06
Minimum Reward: -1766.08
Maximum Reward: 2801.00
Mean Episode Duration: 261.31 steps
Shortest Episode: 1 steps
Longest Episode: 802 steps
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5

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(rl) bhaskar.josh@gnode060 ~/DroneControl/SBAgent ? noise ± python EvaluateModel.py
pybullet build time: May 20 2022 19:45:31
Config Data: Namespace(xmin=0, xmax=2, ymin=-0.5, ymax=0.5, zmin=0, zmax=1, useSafetyBounds=True, minObstacles=0, maxObstacles=4, randomizeObstaclesEveryEpis
ode=True, assistLearning=False, lenientUntil=100000, fixedAltitude=True, episodeLength=1000, showGeoFence=True, showTrajectory=True, showProximityLines=True,
randomizeDronePosition=False, randomizeTargetPosition=False, freq=240, aggregatePhysStep=5, noise=True, mean=0, std_dev=0.01, denoiser='None', measurement_nois
e=0.1)
[INFO] BaseAviary.__init__() loaded parameters from the drone's .urdf:
[INFO] m 0.027000, L 0.039700,
[INFO] lxx 0.000014, lyy 0.000014, lzz 0.000022,
[INFO] kf 0.000000, km 0.000000,
[INFO] t2w 2.250000, max_speed_kmh 30.000000,
[INFO] gnd_eff_coeff 11.368590, prop_radius 0.023135,
[INFO] drag_xy_coeff 0.000001, drag_z_coeff 0.000001,
[INFO] dw_coeff_1 2267.180000, dw_coeff_2 0.160000, dw_coeff_3 -0.110000
/home2/bhaskar.joshi/miniconda3/envs/rl/lib/python3.9/site-packages/gym/spaces/box.py:73: UserWarning: WARN: Box bound precision lowered by casting to float32
logger.warn(
models/ppo v5 2d noise 0.01
100% | 100/100 [00:51<00:00, 1.94it/s]

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EVALUATION STATISTICS
Success Rate: 77.00%
Collision Rate: 23.00%
Mean Distance to Target: N/A
Mean Reward: 418.16
Minimum Reward: -1030.13
Maximum Reward: 1151.81
Mean Episode Duration: 233.26 steps
Shortest Episode: 1 steps
Longest Episode: 325 steps
-----
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6

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(rl) bhaskar.josh@gnode060 ~/DroneControl/SBAgent ? noise ± python EvaluateModel.py
pybullet build time: May 20 2022 19:45:31
Config Data: Namespace(xmin=0, xmax=2, ymin=-0.5, ymax=0.5, zmin=0, zmax=1, useSafetyBounds=True, minObstacles=0, maxObstacles=4, randomizeObstaclesEveryEpis
ode=True, assistLearning=False, lenientUntil=100000, fixedAltitude=True, episodeLength=1000, showGeoFence=True, showTrajectory=True, showProximityLines=True,
randomizeDronePosition=False, randomizeTargetPosition=False, freq=240, aggregatePhysStep=5, noise=True, mean=0, std_dev=0.01, denoiser='None', measurement_nois
e=0.1)
[INFO] BaseAviary.__init__() loaded parameters from the drone's .urdf:
[INFO] m 0.027000, L 0.039700,
[INFO] lxx 0.000014, lyy 0.000014, lzz 0.000022,
[INFO] kf 0.000000, km 0.000000,
[INFO] t2w 2.250000, max_speed_kmh 30.000000,
[INFO] gnd_eff_coeff 11.368590, prop_radius 0.023135,
[INFO] drag_xy_coeff 0.000001, drag_z_coeff 0.000001,
[INFO] dw_coeff_1 2267.180000, dw_coeff_2 0.160000, dw_coeff_3 -0.110000
/home2/bhaskar.joshi/miniconda3/envs/rl/lib/python3.9/site-packages/gym/spaces/box.py:73: UserWarning: WARN: Box bound precision lowered by casting to float32
logger.warn(
models/ppo v5 2d noise 0.01
100% | 1000/1000 [07:43<00:00, 2.16it/s]

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EVALUATION STATISTICS
Success Rate: 69.80%
Collision Rate: 30.20%
Mean Distance to Target: N/A
Mean Reward: 364.55
Minimum Reward: -1991.20
Maximum Reward: 1175.90
Mean Episode Duration: 228.00 steps
Shortest Episode: 1 steps
Longest Episode: 336 steps
-----
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7

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(rl) bhaskar.joshi@gnode060 ~/DroneControl/SBAgent ? noise ± python EvaluateModel.py
pybullet build time: May 20 2022 19:45:31
Config Data: Namespace(xmin=0, xmax=2, ymin=-0.5, ymax=0.5, zmin=0, zmax=1, useSafetyBounds=True, minObstacles=0, maxObstacles=4, randomizeObstaclesEveryEpis
ode=True, assistLearning=False, lenientUntil=100000, fixedAltitude=True, episodeLength=1000, showGeoFence=True, showTrajectory=True, showProximityLines=True,
randomizeDronePosition=False, randomizeTargetPosition=False, freq=240, aggregatePhysStep=5, noise=True, mean=0, std_dev=0.1, denoiser='None', measurement_noise
=0.1)
[INFO] BaseAviary.__init__() loaded parameters from the drone's .urdf:
[INFO] m 0.027000, L 0.039700,
[INFO] lxx 0.000014, lyy 0.000014, lzz 0.000022,
[INFO] kf 0.000000, km 0.000000,
[INFO] t2w 2.250000, max_speed_kmh 30.000000,
[INFO] gnd_eff_coeff 11.368590, prop_radius 0.023135,
[INFO] drag_xy_coeff 0.000001, drag_z_coeff 0.000001,
[INFO] dw_coeff_1 2267.180000, dw_coeff_2 0.160000, dw_coeff_3 -0.110000
/home2/bhaskar.joshi/miniconda3/envs/rl/lib/python3.9/site-packages/gym/spaces/box.py:73: UserWarning: WARN: Box bound precision lowered by casting to float32
logger.warn(
models/ppo_v5_2d_noise_0.1
100% | 100/100 [02:03<00:00, 1.24s/it]

-----
EVALUATION STATISTICS
Success Rate: 51.00%
Collision Rate: 29.00%
Mean Distance to Target: 0.77
Mean Reward: -570.73
Minimum Reward: -8122.04
Maximum Reward: 1090.90
Mean Episode Duration: 603.37 steps
Shortest Episode: 1 steps
Longest Episode: 1000 steps
```

8

```
(rl) bhaskar.joshi@gnode060 ~/DroneControl/SBAgent ? noise ± python EvaluateModel.py
pybullet build time: May 20 2022 19:45:31
Config Data: Namespace(xmin=0, xmax=2, ymin=-0.5, ymax=0.5, zmin=0, zmax=1, useSafetyBounds=True, minObstacles=0, maxObstacles=4, randomizeObstaclesEveryEpis
ode=True, assistLearning=False, lenientUntil=100000, fixedAltitude=True, episodeLength=1000, showGeoFence=True, showTrajectory=True, showProximityLines=True,
randomizeDronePosition=False, randomizeTargetPosition=False, freq=240, aggregatePhysStep=5, noise=True, mean=0, std_dev=0.1, denoiser='None', measurement_noise
=0.1)
[INFO] BaseAviary.__init__() loaded parameters from the drone's .urdf:
[INFO] m 0.027000, L 0.039700,
[INFO] lxx 0.000014, lyy 0.000014, lzz 0.000022,
[INFO] kf 0.000000, km 0.000000,
[INFO] t2w 2.250000, max_speed_kmh 30.000000,
[INFO] gnd_eff_coeff 11.368590, prop_radius 0.023135,
[INFO] drag_xy_coeff 0.000001, drag_z_coeff 0.000001,
[INFO] dw_coeff_1 2267.180000, dw_coeff_2 0.160000, dw_coeff_3 -0.110000
/home2/bhaskar.joshi/miniconda3/envs/rl/lib/python3.9/site-packages/gym/spaces/box.py:73: UserWarning: WARN: Box bound precision lowered by casting to float32
logger.warn(
models/ppo_v5_2d_noise_0.1
100% | 1000/1000 [18:38<00:00, 1.12s/it]

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EVALUATION STATISTICS
Success Rate: 54.00%
Collision Rate: 31.50%
Mean Distance to Target: 0.86
Mean Reward: -621.83
Minimum Reward: -10740.25
Maximum Reward: 1169.47
Mean Episode Duration: 570.33 steps
Shortest Episode: 1 steps
Longest Episode: 1000 steps
```

9

```
(rl) bhaskar.joshi@gnode060 ~/DroneControl/SBAgent ? noise ± python EvaluateModel.py
pybullet build time: May 20 2022 19:45:31
Config Data: Namespace(xmin=0, xmax=2, ymin=-0.5, ymax=0.5, zmin=0, zmax=1, useSafetyBounds=True, minObstacles=0, maxObstacles=4, randomizeObstaclesEveryEpis
ode=True, assistLearning=False, lenientUntil=100000, fixedAltitude=True, episodeLength=1000, showGeoFence=True, showTrajectory=True, showProximityLines=True,
randomizeDronePosition=False, randomizeTargetPosition=False, freq=240, aggregatePhysStep=5, noise=True, mean=0, std_dev=0.1, denoiser='LPFDenoiser', measuremen
t_noise=0.1)
[INFO] BaseAviary.__init__() loaded parameters from the drone's .urdf:
[INFO] m 0.027000, L 0.039700,
[INFO] lxx 0.000014, lyy 0.000014, lzz 0.000022,
[INFO] kf 0.000000, km 0.000000,
[INFO] t2w 2.250000, max_speed_kmh 30.000000,
[INFO] gnd_eff_coeff 11.368590, prop_radius 0.023135,
[INFO] drag_xy_coeff 0.000001, drag_z_coeff 0.000001,
[INFO] dw_coeff_1 2267.180000, dw_coeff_2 0.160000, dw_coeff_3 -0.110000
/home2/bhaskar.joshi/miniconda3/envs/rl/lib/python3.9/site-packages/gym/spaces/box.py:73: UserWarning: WARN: Box bound precision lowered by casting to float32
logger.warn(
models/ppo_v6_lpf_0.1_exp_avg_alpha=0.1
100% | 100/100 [01:09<00:00, 1.45t/s]

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EVALUATION STATISTICS
Success Rate: 31.00%
Collision Rate: 69.00%
Mean Distance to Target: N/A
Mean Reward: -301.91
Minimum Reward: -2052.84
Maximum Reward: 1331.96
Mean Episode Duration: 300.00 steps
Shortest Episode: 1 steps
Longest Episode: 586 steps
```

10	<pre>(rl) bhaskar.joshi@gnode060 ~/DroneControl/SBAgent 7 noise ± python EvaluateModel.py pybullet build time: May 20 2022 19:45:31 Config Data: Namespace(xmin=0, xmax=2, ymin=-0.5, ymax=0.5, zmin=0, zmax=1, useSafetyBounds=True, minObstacles=0, maxObstacles=4, randomizeObstaclesEveryEpis ode=True, assistLearning=False, lententUntil=100000, fixedAltitude=True, episodeLength=1000, showGeoFence=True, showTrajectory=True, showProximityLines=True, randomizeDronePosition=False, randomizeTargetPosition=False, freq=240, aggregatePhysStep=5, noise=True, mean=0, std_dev=0.1, denoiser='LPFDenoiser', measuremen t_noise=0.1) [INFO] BaseAviary._init_() loaded parameters from the drone's .urdf: [INFO] m 0.027000, L 0.039700, [INFO] ixx 0.000014, iyy 0.000014, izz 0.000022, [INFO] kf 0.000000, km 0.000000, [INFO] t2w 2.250000, max_speed_kmh 30.000000, [INFO] gnd_eff_coeff 11.368590, prop_radius 0.023135, [INFO] drag_xy_coeff 0.000001, drag_z_coeff 0.000001, [INFO] dw_coeff_1 2267.100000, dw_coeff_2 0.160000, dw_coeff_3 -0.110000 /home2/bhaskar.joshi/miniconda3/envs/rl/lib/python3.9/site-packages/gym/spaces/box.py:73: UserWarning: WARN: Box bound precision lowered by casting to float32 logger.warn(models/ppo_v6_lpf_0.1_exp_avg_alpha=0.1 100% 1000/1000 [11:31<00:00, 1.45it/s] ----- EVALUATION STATISTICS Success Rate: 39.40% Collision Rate: 60.60% Mean Distance to Target: N/A Mean Reward: -96.70 Minimum Reward: -2710.91 Maximum Reward: 1398.87 Mean Episode Duration: 326.93 steps Shortest Episode: 1 steps Longest Episode: 632 steps -----</pre>
11	<pre>(rl) x bhaskar.joshi@gnode060 ~/DroneControl/SBAgent 7 noise ± python EvaluateModel.py pybullet build time: May 20 2022 19:45:31 Config Data: Namespace(xmin=0, xmax=2, ymin=-0.5, ymax=0.5, zmin=0, zmax=1, useSafetyBounds=True, minObstacles=0, maxObstacles=4, randomizeObstaclesEveryEpis ode=True, assistLearning=False, lententUntil=100000, fixedAltitude=True, episodeLength=1000, showGeoFence=True, showTrajectory=True, showProximityLines=True, randomizeDronePosition=False, randomizeTargetPosition=False, freq=240, aggregatePhysStep=5, noise=True, mean=0, std_dev=0.1, denoiser='LPFDenoiser', measuremen t_noise=0.1) [INFO] BaseAviary._init_() loaded parameters from the drone's .urdf: [INFO] m 0.027000, L 0.039700, [INFO] ixx 0.000014, iyy 0.000014, izz 0.000022, [INFO] kf 0.000000, km 0.000000, [INFO] t2w 2.250000, max_speed_kmh 30.000000, [INFO] gnd_eff_coeff 11.368590, prop_radius 0.023135, [INFO] drag_xy_coeff 0.000001, drag_z_coeff 0.000001, [INFO] dw_coeff_1 2267.100000, dw_coeff_2 0.160000, dw_coeff_3 -0.110000 /home2/bhaskar.joshi/miniconda3/envs/rl/lib/python3.9/site-packages/gym/spaces/box.py:73: UserWarning: WARN: Box bound precision lowered by casting to float32 logger.warn(models/ppo_v6_lpf_0.1_exp_avg 100% 100/100 [01:14<00:00, 1.35it/s] ----- EVALUATION STATISTICS Success Rate: 64.00% Collision Rate: 36.00% Mean Distance to Target: N/A Mean Reward: 271.84 Minimum Reward: -2263.47 Maximum Reward: 1468.99 Mean Episode Duration: 344.99 steps Shortest Episode: 1 steps Longest Episode: 609 steps -----</pre>
12	<pre>(rl) x bhaskar.joshi@gnode060 ~/DroneControl/SBAgent 7 noise ± python EvaluateModel.py pybullet build time: May 20 2022 19:45:31 Config Data: Namespace(xmin=0, xmax=2, ymin=-0.5, ymax=0.5, zmin=0, zmax=1, useSafetyBounds=True, minObstacles=0, maxObstacles=4, randomizeObstaclesEveryEpis ode=True, assistLearning=False, lententUntil=100000, fixedAltitude=True, episodeLength=1000, showGeoFence=True, showTrajectory=True, showProximityLines=True, randomizeDronePosition=False, randomizeTargetPosition=False, freq=240, aggregatePhysStep=5, noise=True, mean=0, std_dev=0.1, denoiser='LPFDenoiser', measuremen t_noise=0.1) [INFO] BaseAviary._init_() loaded parameters from the drone's .urdf: [INFO] m 0.027000, L 0.039700, [INFO] ixx 0.000014, iyy 0.000014, izz 0.000022, [INFO] kf 0.000000, km 0.000000, [INFO] t2w 2.250000, max_speed_kmh 30.000000, [INFO] gnd_eff_coeff 11.368590, prop_radius 0.023135, [INFO] drag_xy_coeff 0.000001, drag_z_coeff 0.000001, [INFO] dw_coeff_1 2267.100000, dw_coeff_2 0.160000, dw_coeff_3 -0.110000 /home2/bhaskar.joshi/miniconda3/envs/rl/lib/python3.9/site-packages/gym/spaces/box.py:73: UserWarning: WARN: Box bound precision lowered by casting to float32 logger.warn(models/ppo_v6_lpf_0.1_exp_avg 100% 1000/1000 [12:39<00:00, 1.32it/s] ----- EVALUATION STATISTICS Success Rate: 62.40% Collision Rate: 37.60% Mean Distance to Target: N/A Mean Reward: 239.67 Minimum Reward: -3369.90 Maximum Reward: 1468.99 Mean Episode Duration: 366.64 steps Shortest Episode: 1 steps Longest Episode: 647 steps -----</pre>

13

```
(rl) bhaskar.joshi@gnode060 > ~/DroneControl/SBAgent -f noise ± python EvaluateModel.py
pybullet build time: May 20 2022 19:45:31
Config Data: Namespace(xmin=0, xmax=2, ymin=-0.5, ymax=0.5, zmin=0, zmax=1, useSafetyBounds=True, minObstacles=0, maxObstacles=4, randomizeObstaclesEveryEpis
ode=True, assistLearning=False, lenientUntil=100000, fixedAltitude=True, episodeLength=1000, showGeoFence=True, showTrajectory=True, showProximityLines=True,
randomizeDronePosition=False, randomizeTargetPosition=False, freq=240, aggregatePhysStep=5, noise=True, mean=0, std_dev=0.1, denoiser='KFDenoiser', measurement
_noise=0.1)
[INFO] BaseAviary.__init__() loaded parameters from the drone's .urdf:
[INFO] m 0.027000, L 0.039700,
[INFO] lxx 0.000014, lyy 0.000014, lzz 0.000022,
[INFO] kf 0.000000, km 0.000000,
[INFO] t2w 2.250000, max_speed_kmh 30.000000,
[INFO] gnd_eff_coeff 11.368590, prop_radius 0.023135,
[INFO] drag_xy_coeff 0.000001, drag_z_coeff 0.000001,
[INFO] dw_coeff_1 2267.180000, dw_coeff_2 0.160000, dw_coeff_3 -0.110000
/home2/bhaskar.joshi/miniconda3/envs/rl/lib/python3.9/site-packages/gym/spaces/box.py:73: UserWarning: WARN: Box bound precision lowered by casting to float32
logger.warn(
models/ppo_v6 kf
100% | 100/100 [00:52<00:00, 1.89it/s]

-----
EVALUATION STATISTICS
Success Rate: 63.00%
Collision Rate: 37.00%
Mean Distance to Target: N/A
Mean Reward: 390.85
Minimum Reward: -1592.19
Maximum Reward: 1174.98
Mean Episode Duration: 223.57 steps
Shortest Episode: 1 steps
Longest Episode: 334 steps
-----
```

14

```
(rl) * bhaskar.joshi@gnode060 > ~/DroneControl/SBAgent -f noise ± python EvaluateModel.py
pybullet build time: May 20 2022 19:45:31
Config Data: Namespace(xmin=0, xmax=2, ymin=-0.5, ymax=0.5, zmin=0, zmax=1, useSafetyBounds=True, minObstacles=0, maxObstacles=4, randomizeObstaclesEveryEpis
ode=True, assistLearning=False, lenientUntil=100000, fixedAltitude=True, episodeLength=1000, showGeoFence=True, showTrajectory=True, showProximityLines=True,
randomizeDronePosition=False, randomizeTargetPosition=False, freq=240, aggregatePhysStep=5, noise=True, mean=0, std_dev=0.1, denoiser='KFDenoiser', measurement
_noise=0.1)
[INFO] BaseAviary.__init__() loaded parameters from the drone's .urdf:
[INFO] m 0.027000, L 0.039700,
[INFO] lxx 0.000014, lyy 0.000014, lzz 0.000022,
[INFO] kf 0.000000, km 0.000000,
[INFO] t2w 2.250000, max_speed_kmh 30.000000,
[INFO] gnd_eff_coeff 11.368590, prop_radius 0.023135,
[INFO] drag_xy_coeff 0.000001, drag_z_coeff 0.000001,
[INFO] dw_coeff_1 2267.180000, dw_coeff_2 0.160000, dw_coeff_3 -0.110000
/home2/bhaskar.joshi/miniconda3/envs/rl/lib/python3.9/site-packages/gym/spaces/box.py:73: UserWarning: WARN: Box bound precision lowered by casting to float32
logger.warn(
models/ppo_v6 kf
100% | 1000/1000 [08:54<00:00, 1.87it/s]

-----
EVALUATION STATISTICS
Success Rate: 60.60%
Collision Rate: 39.40%
Mean Distance to Target: N/A
Mean Reward: 304.61
Minimum Reward: -1709.45
Maximum Reward: 1174.98
Mean Episode Duration: 230.91 steps
Shortest Episode: 1 steps
Longest Episode: 348 steps
-----
```

15

```
(rl) * bhaskar.joshi@gnode060 > ~/DroneControl/SBAgent -f noise ± python EvaluateModel.py
pybullet build time: May 20 2022 19:45:31
Config Data: Namespace(xmin=0, xmax=2, ymin=-0.5, ymax=0.5, zmin=0, zmax=1, useSafetyBounds=True, minObstacles=0, maxObstacles=4, randomizeObstaclesEveryEpis
ode=True, assistLearning=False, lenientUntil=100000, fixedAltitude=True, episodeLength=1000, showGeoFence=True, showTrajectory=True, showProximityLines=True,
randomizeDronePosition=False, randomizeTargetPosition=False, freq=240, aggregatePhysStep=5, noise=True, mean=0, std_dev=0.1, denoiser='KFDenoiser', measurement
_noise=0.1)
[INFO] BaseAviary.__init__() loaded parameters from the drone's .urdf:
[INFO] m 0.027000, L 0.039700,
[INFO] lxx 0.000014, lyy 0.000014, lzz 0.000022,
[INFO] kf 0.000000, km 0.000000,
[INFO] t2w 2.250000, max_speed_kmh 30.000000,
[INFO] gnd_eff_coeff 11.368590, prop_radius 0.023135,
[INFO] drag_xy_coeff 0.000001, drag_z_coeff 0.000001,
[INFO] dw_coeff_1 2267.180000, dw_coeff_2 0.160000, dw_coeff_3 -0.110000
/home2/bhaskar.joshi/miniconda3/envs/rl/lib/python3.9/site-packages/gym/spaces/box.py:73: UserWarning: WARN: Box bound precision lowered by casting to float32
logger.warn(
models/ppo_v6 kf not so good
100% | 100/100 [00:54<00:00, 1.84it/s]

-----
EVALUATION STATISTICS
Success Rate: 50.00%
Collision Rate: 50.00%
Mean Distance to Target: N/A
Mean Reward: 135.78
Minimum Reward: -1861.09
Maximum Reward: 1147.90
Mean Episode Duration: 222.27 steps
Shortest Episode: 1 steps
Longest Episode: 337 steps
-----
```

16

```
(rl) bhaskar.joshi@node060 ~/dronecontrol/SBAgent ? noise ± python EvaluateModel.py
pybullet build time: May 20 2022 19:45:31
Config Data: Namespace(xmin=0, xmax=2, ymin=-0.5, ymax=0.5, zmin=0, zmax=1, useSafetyBounds=True, minObstacles=0, maxObstacles=4, randomizeObstaclesEveryEpis
ode=True, assistLearning=False, lenientUntil=100000, fixedAltitude=True, episodeLength=1000, showGeoFence=True, showTrajectory=True, showProximityLines=True,
randomizeDronePosition=False, randomizeTargetPosition=False, freq=240, aggregatePhysStep=5, noise=True, mean=0, std_dev=0.1, denoiser='KFdenoiser', measurement
_noise=0.1)
[INFO] BaseAviary.__init__() loaded parameters from the drone's .urdf:
[INFO] m 0.027000, L 0.039700,
[INFO] lxx 0.000014, lyy 0.000014, lzz 0.000022,
[INFO] kf 0.000000, km 0.000000,
[INFO] t2w 2.250000, max_speed_kmh 30.000000,
[INFO] gnd_eff_coeff 11.368590, prop_radius 0.023135,
[INFO] drag_xy_coeff 0.000001, drag_z_coeff 0.000001,
[INFO] dw_coeff_1 2267.180000, dw_coeff_2 0.160000, dw_coeff_3 -0.110000
/home2/bhaskar.joshi/miniconda3/envs/rl/lib/python3.9/site-packages/gym/spaces/box.py:73: UserWarning: WARN: Box bound precision lowered by casting to float32
  logger.warn(
models/ppov6 kf not so good
100% | 1000/1000 [08:49<00:00, 1.89it/s]

=====
EVALUATION STATISTICS
Success Rate: 64.80%
Collision Rate: 35.20%
Mean Distance to Target: N/A
Mean Reward: 377.24
Minimum Reward: -1861.09
Maximum Reward: 1200.72
Mean Episode Duration: 238.51 steps
Shortest Episode: 1 steps
Longest Episode: 339 steps
=====
```

17

```
(rl) bhaskar.joshi@node060 ~/dronecontrol/SBAgent ? noise ± python EvaluateModel.py
pybullet build time: May 20 2022 19:45:31
Config Data: Namespace(xmin=0, xmax=2, ymin=-0.5, ymax=0.5, zmin=0, zmax=1, useSafetyBounds=True, minObstacles=0, maxObstacles=4, randomizeObstaclesEveryEpis
ode=True, assistLearning=False, lenientUntil=100000, fixedAltitude=True, episodeLength=1000, showGeoFence=True, showTrajectory=True, showProximityLines=True,
randomizeDronePosition=False, randomizeTargetPosition=False, freq=240, aggregatePhysStep=5, noise=True, mean=0, std_dev=0.1, denoiser='KFdenoiser', measurement
_noise=0.1)
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[INFO] lxx 0.000014, lyy 0.000014, lzz 0.000022,
[INFO] kf 0.000000, km 0.000000,
[INFO] t2w 2.250000, max_speed_kmh 30.000000,
[INFO] gnd_eff_coeff 11.368590, prop_radius 0.023135,
[INFO] drag_xy_coeff 0.000001, drag_z_coeff 0.000001,
[INFO] dw_coeff_1 2267.180000, dw_coeff_2 0.160000, dw_coeff_3 -0.110000
/home2/bhaskar.joshi/miniconda3/envs/rl/lib/python3.9/site-packages/gym/spaces/box.py:73: UserWarning: WARN: Box bound precision lowered by casting to float32
  logger.warn(
models/ppov6 kf not so good
100% | 100/100 [00:54<00:00, 1.82it/s]

=====
EVALUATION STATISTICS
Success Rate: 60.00%
Collision Rate: 40.00%
Mean Distance to Target: N/A
Mean Reward: 331.11
Minimum Reward: -2087.43
Maximum Reward: 1181.35
Mean Episode Duration: 241.45 steps
Shortest Episode: 1 steps
Longest Episode: 337 steps
=====
```

18

```
(rl) bhaskar.joshi@node060 ~/dronecontrol/SBAgent ? noise ± python EvaluateModel.py
pybullet build time: May 20 2022 19:45:31
Config Data: Namespace(xmin=0, xmax=2, ymin=-0.5, ymax=0.5, zmin=0, zmax=1, useSafetyBounds=True, minObstacles=0, maxObstacles=4, randomizeObstaclesEveryEpis
ode=True, assistLearning=False, lenientUntil=100000, fixedAltitude=True, episodeLength=1000, showGeoFence=True, showTrajectory=True, showProximityLines=True,
randomizeDronePosition=False, randomizeTargetPosition=False, freq=240, aggregatePhysStep=5, noise=True, mean=0, std_dev=0.1, denoiser='KFdenoiser', measurement
_noise=0.1)
[INFO] BaseAviary.__init__() loaded parameters from the drone's .urdf:
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[INFO] lxx 0.000014, lyy 0.000014, lzz 0.000022,
[INFO] kf 0.000000, km 0.000000,
[INFO] t2w 2.250000, max_speed_kmh 30.000000,
[INFO] gnd_eff_coeff 11.368590, prop_radius 0.023135,
[INFO] drag_xy_coeff 0.000001, drag_z_coeff 0.000001,
[INFO] dw_coeff_1 2267.180000, dw_coeff_2 0.160000, dw_coeff_3 -0.110000
/home2/bhaskar.joshi/miniconda3/envs/rl/lib/python3.9/site-packages/gym/spaces/box.py:73: UserWarning: WARN: Box bound precision lowered by casting to float32
  logger.warn(
models/ppov6 kf not so good seed=5
100% | 1000/1000 [08:55<00:00, 1.87it/s]

=====
EVALUATION STATISTICS
Success Rate: 64.10%
Collision Rate: 35.90%
Mean Distance to Target: N/A
Mean Reward: 338.90
Minimum Reward: -2189.20
Maximum Reward: 1188.11
Mean Episode Duration: 238.91 steps
Shortest Episode: 1 steps
Longest Episode: 344 steps
=====
```