

Homework #06

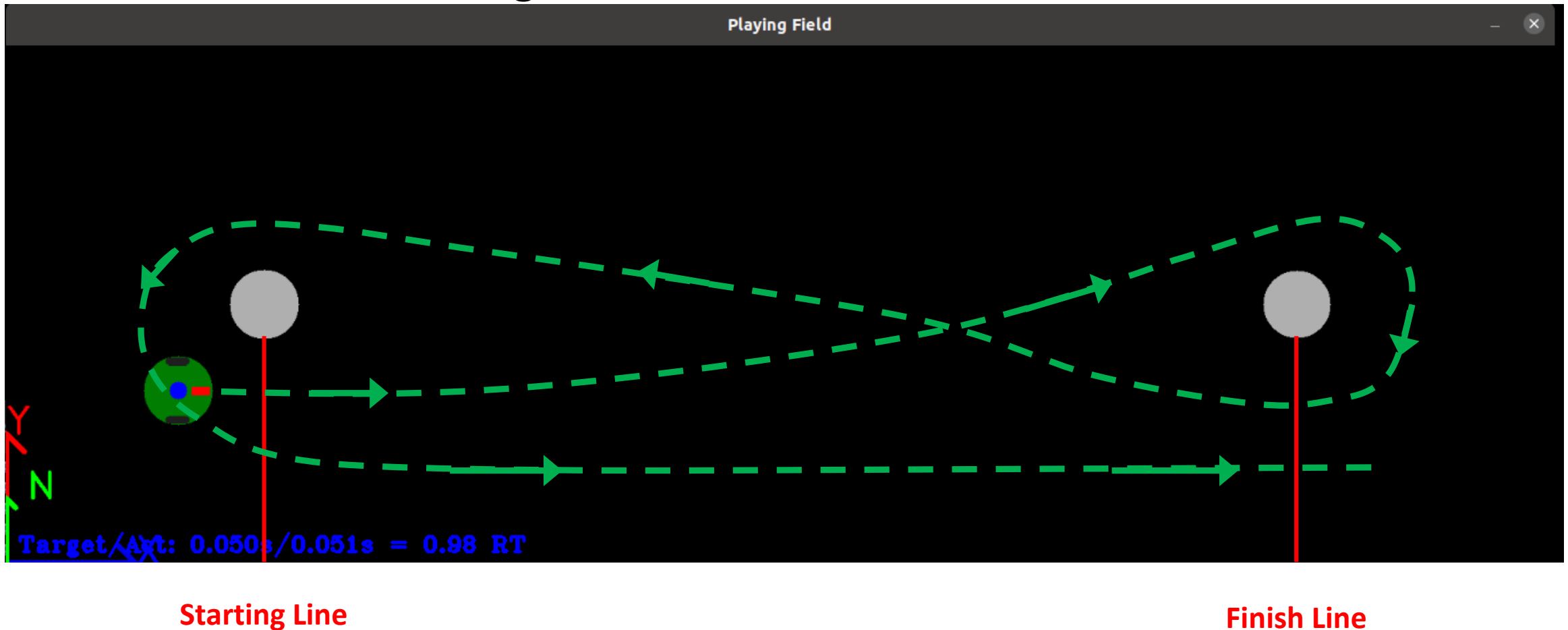
Spring 2023

Joystick Drive

MRE/EME 5983 Robot Operating Systems

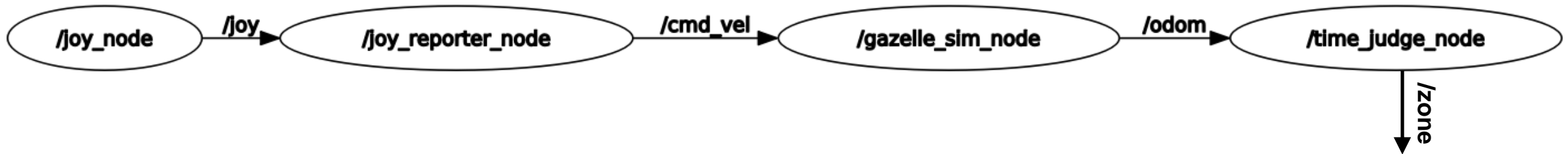
Joystick Drive – Overview

- The joystick drive node will facilitate the evaluation of a robot driving a “barrel course” or “figure-8 course”



Joystick Drive – ROS Network

- You will need to create two nodes to complete this assignment
 - joy_reporter_node
 - Send joystick generated twist messages to the simulator
 - You can leverage your previous homework assignment with no modifications!
 - time_judge_node
 - This node is responsible for reporting the time elapsed to complete the course and ensure that the course was completed legally
 - Publish the zone id when the robot enters a valid zone on a topic name “/zone”

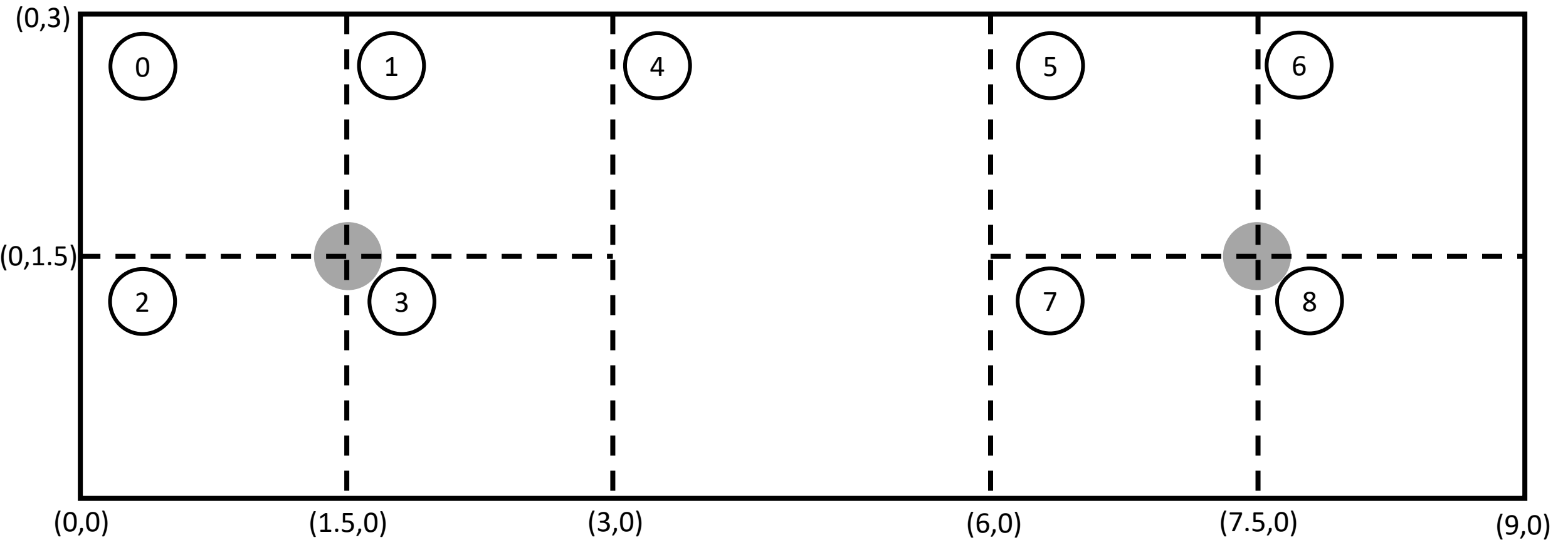


Joystick Drive – Judging

- Your solution must include the evaluation of how well the robot traversed the course and provide the time needed to complete the course
- Timing
 - Start timer when robot CG crosses the starting line
 - Stop timer when robot CG crosses the finish line
 - Elapsed time = Stop time – Start time
- Legal course travel
 - You must ensure that the robot completes the course legally
 - One method to ensure a valid path is to establish travel “zones” and verify that the robot is traversing the course legally

Joystick Drive – Zone Definitions

- Track the robot's zone location



Start Timer

Stop Timer

Zone sequence: 2, 3, 4, 5, 6, 8, 7, 4, 1, 0, 2, 3, 4, 7, 8

Joystick Drive – Required Outputs

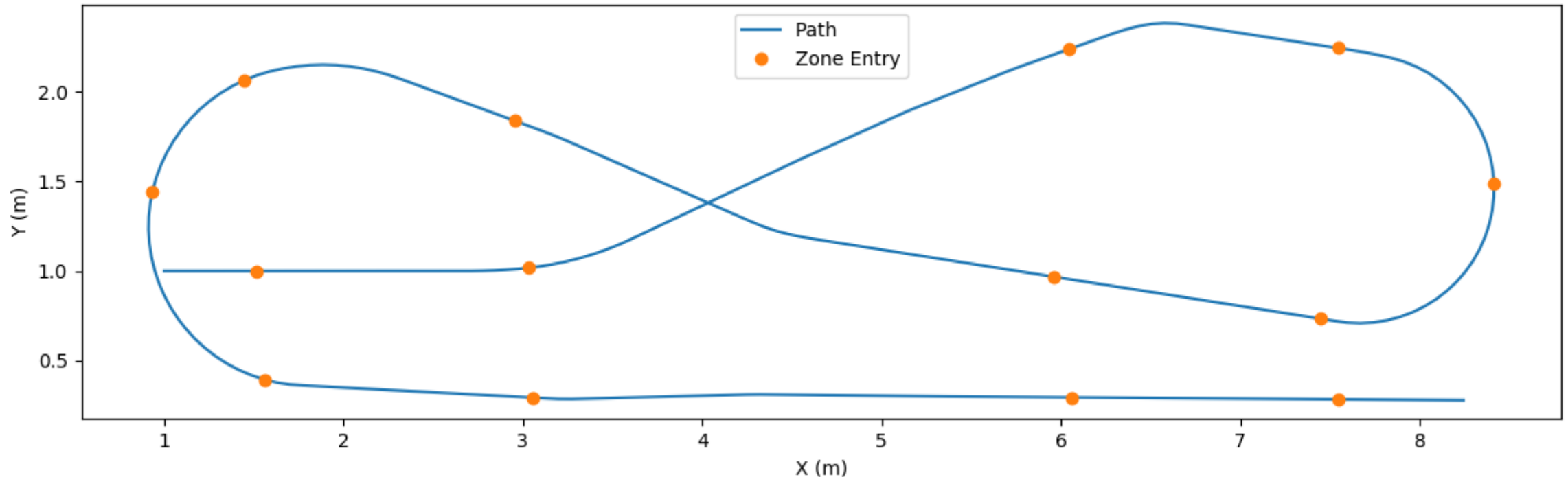
- Your ROS network must report
 - When the robot enters the next legal zone in the zone sequence list to the terminal and to the topic /zone
 - When the timer is started and stopped
 - The time (in seconds) to complete the course

```
[INFO] [1671488595.369168]: Zone = 2
[INFO] [1671488601.116437]: Zone = 3
[INFO] [1671488601.119867]: ==>> START TIMER <<==
[INFO] [1671488602.615822]: Zone = 4
[INFO] [1671488605.765899]: Zone = 5
[INFO] [1671488607.467512]: Zone = 6
[INFO] [1671488608.615881]: Zone = 8
[INFO] [1671488610.265212]: Zone = 7
[INFO] [1671488611.820131]: Zone = 4
[INFO] [1671488614.921582]: Zone = 1
[INFO] [1671488616.515995]: Zone = 0
[INFO] [1671488617.566534]: Zone = 2
[INFO] [1671488620.417647]: Zone = 3
[INFO] [1671488621.917269]: Zone = 4
[INFO] [1671488624.917618]: Zone = 7
[INFO] [1671488626.416593]: Zone = 8
[INFO] [1671488626.419532]: ==>> FINISH <<==
[INFO] [1671488626.422452]: Course complete in 25.30 sec
```

Make sure to use the “Hard Collision” option in GazelleSim to ensure the robot cannot drive through the obstructions

Joystick Drive – Post Processing

- Using the /odom and /zone topics, produce a plot showing the robot path and indicated the location on the path where valid zone transitions occurred



To set the axis scaling to be equal proportions, use the following

```
ax = plt.gca()
```

```
ax.set_aspect('equal', adjustable='box')
```

Homework Instructions / Submissions

- Homework content
 - Create a working directory called hw06_lastname (ex. hw06_derose)
 - Use a launch file hw06_lastname.launch to execute the ROS network
 - Place all post processing scripts and images in a **post** directory in your package
 - Record a video of your script executing (.mpg or .webm) and place it in the post directory
- Homework submission
 - Use tar and gzip to create a single, compressed file with the working directory and all its contents
 - Upload this file to Canvas for your homework submission