# Report 4 - Nihal Afsal

# Object Detection Using a Radar

*Note:* Homework must be uploaded as a **single pdf file**, not a zip file. If a problem solution requires a video, add it as a hyperlink in the pdf. The hyperlink should open the video file which is stored on your Google Drive. Any problem that requires Python code must show the entire code as well as a description of how the code works. Duplicate code submissions will result in a zero.

1. Create a custom turtlebot simulation in ROS that shows 2 turtlebots driving in circles simultaneously on a gray background. Show all ROS commands you used to make this work. *(25 pts)*

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```
rosparam set /turtlesim/background_r 171
rosparam set /turtlesim/background_g 171
rosparam set /turtlesim/background_b 171

rosrun turtlesim turtlesim_node
rosservice call /spawn "{x: 5, y: 5, theta: 0, name:
'turtle2'}"

cd Downloads
rosrun turtlesim turtle_teleop_key
rosbag record -a
rosbag play -l circle.bag
rosbag play -l circle.bag /turtle1/cmd_vel:=/turtle2/cmd_vel
```

2. Real world radar data is available on Elearning in a *.bag fle. Show the detections from this data in Rviz and describe in 2-3 sentences how you accomplished it. *(30 pts)*

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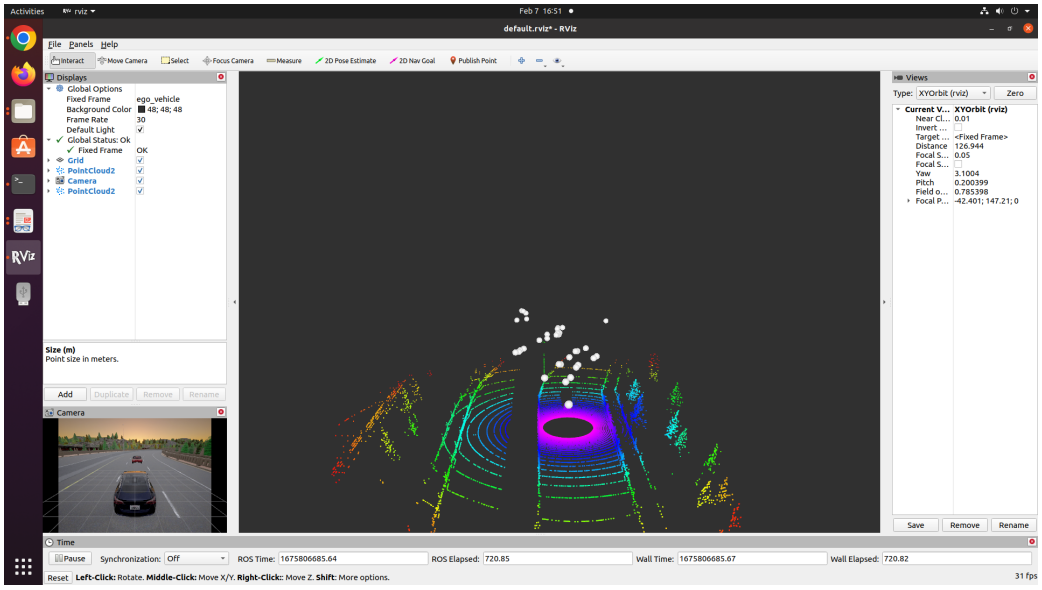

- The process was challenging, but I eventually figured it out. First, I had to identify the correct .bag file to stream, and ultimately realized I needed to use the Carla.bag file, so I loaded it onto RVIZ. I then added the appropriate props from the folder where I had put the camera, lidar, and radar. Unfortunately, when I went through this process, numerous elements—including the lidar—were not correctly aligned with the grid; as a result, I had to zoom out and realign using the middle mouse button significantly. Overall, it was a difficult task, but I got it done!

3. Complete the following documents in the Projects folder on Elearning. Each member of the team should turn in the same thing. *(15 pts)*

    a. Group Norms Discussion

    b. Task Matrix

    c. Meeting Minutes

5. *CS/ME 6950 Students Only:* Use Google Scholar to identify a publication about radar object detection for autonomous vehicles. Summarize it in your own words (4-5 sentences max) and show the citation. *(15 pts)*

- *I am an undergraduate student.*