PROJECT 1 REPORT

November 7, 2023

1 Steps and process followed

The project was studied and executed as follows:

1. A base model of the toy car was built initially in order to test the steering mechanism in the gazebo.
2. A base model was exported as URDF and then launched in Gazebo with the appropriate launch files and controllers.
3. The working mechanism of the toy car was understood and then ideas for better design of the toy car were noted.
4. Remodelling of the toy car was done according to the required design and aesthetic parameters and the model was exported as URDF.
5. Controllers were added to the toy car model and the model was launched in the Gazebo world. The steering and the motion of the toy car were checked.
6. Once the toy car passed the preliminary checks, the competition world was set up and the toy car was run in the competition setup using the teleop script.
7. The code for the closed-loop controller was written and implemented.
8. The model was launched in Rviz and the lidar visualization was carried out.

2 Problems faced

Below are some of the problems faced during the execution of the project:

1. Understanding the position controller and its working. Faced problems to steer the toy car initially and was able to rectify it post-modification in the URDF file.
2. Unable to launch the toy car completely in Rviz. Some of the components were missing in Rviz. Rectified this post addition of appropriate controllers.
3. Toycar moving in a curved path even without steering. Rectified with design modifications.

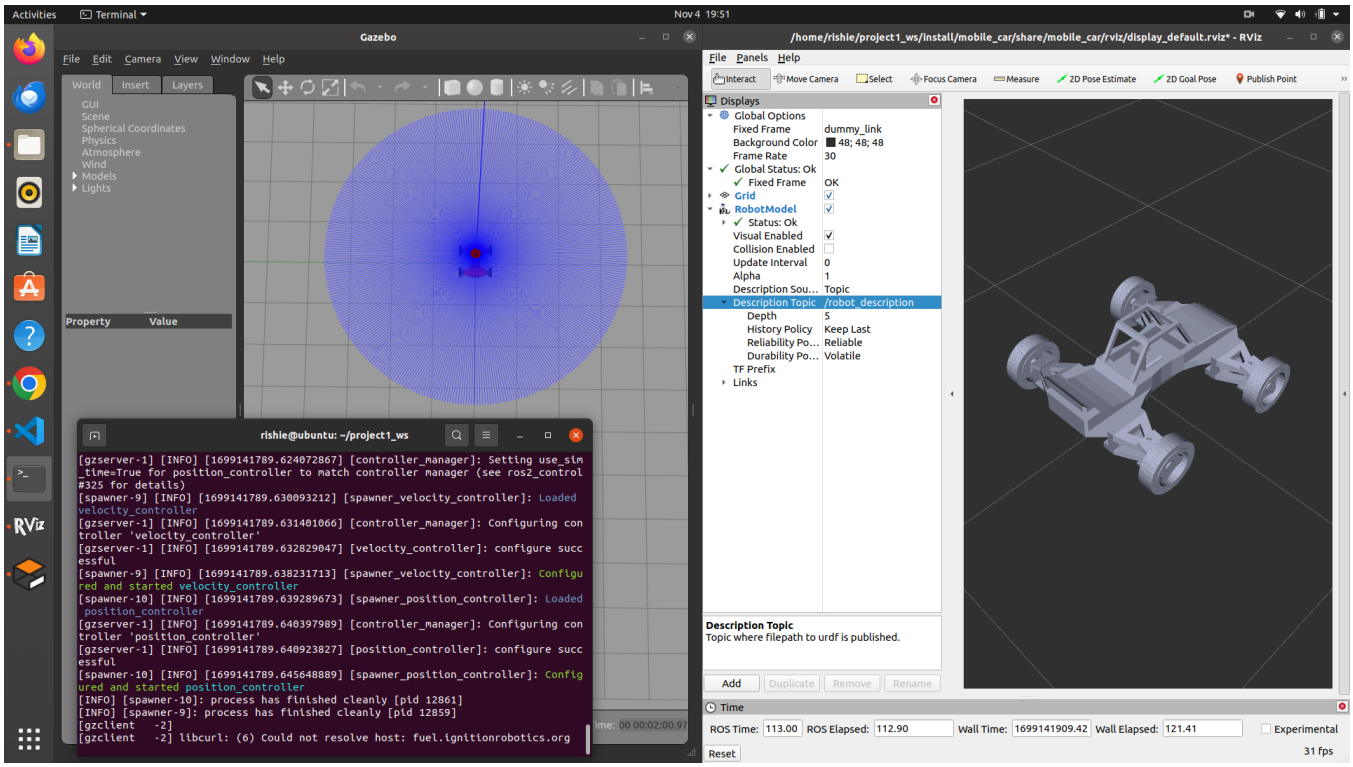
3 Personal Contribution

1. Design and modeling of the toy car in Solidworks.
2. Definition of the links and joints and generation of the URDF and meshes.
3. Setup of the launch files and the controllers required to move the toy car in the empty Gazebo world.
4. Setup of the competition arena and the teleop script required to move the toy car in the competition arena.

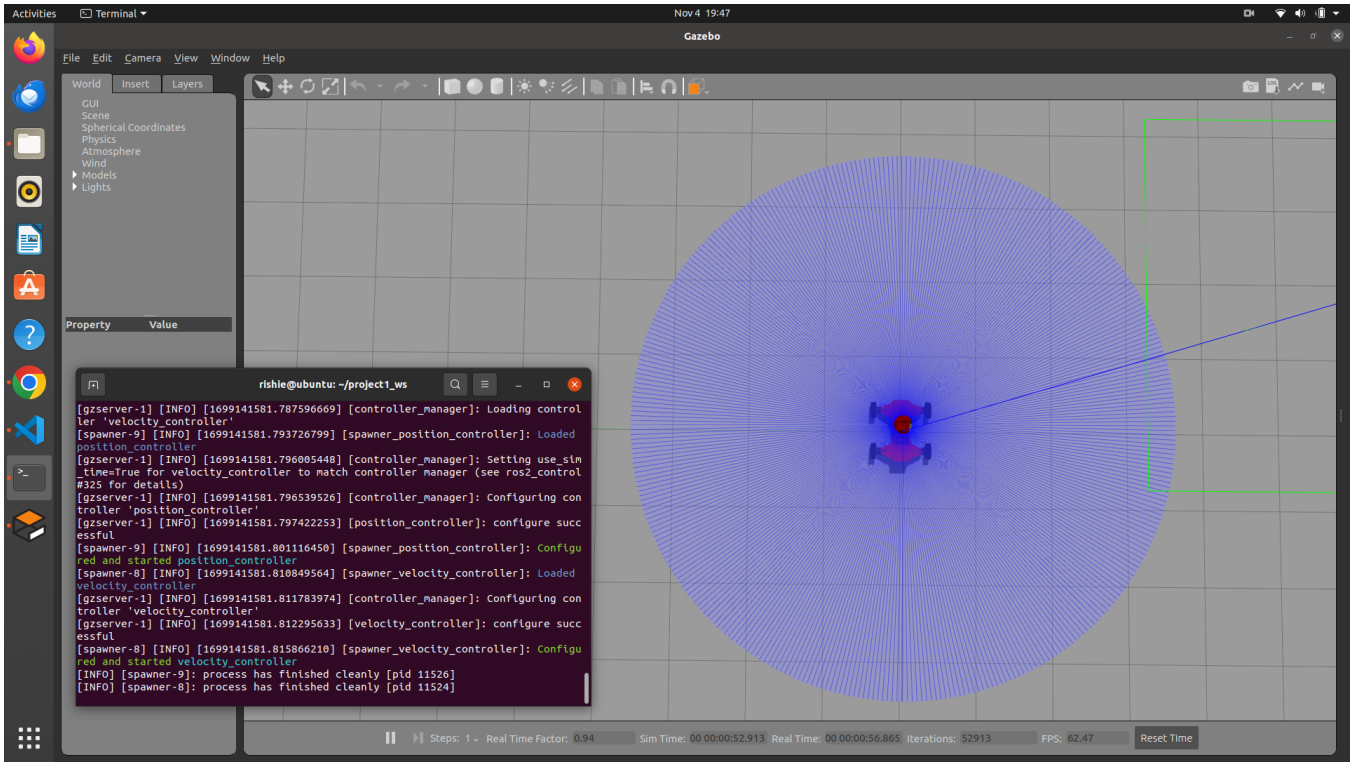
4 Pictures as per project rubric

The snapshots as per the rubric has been attached:

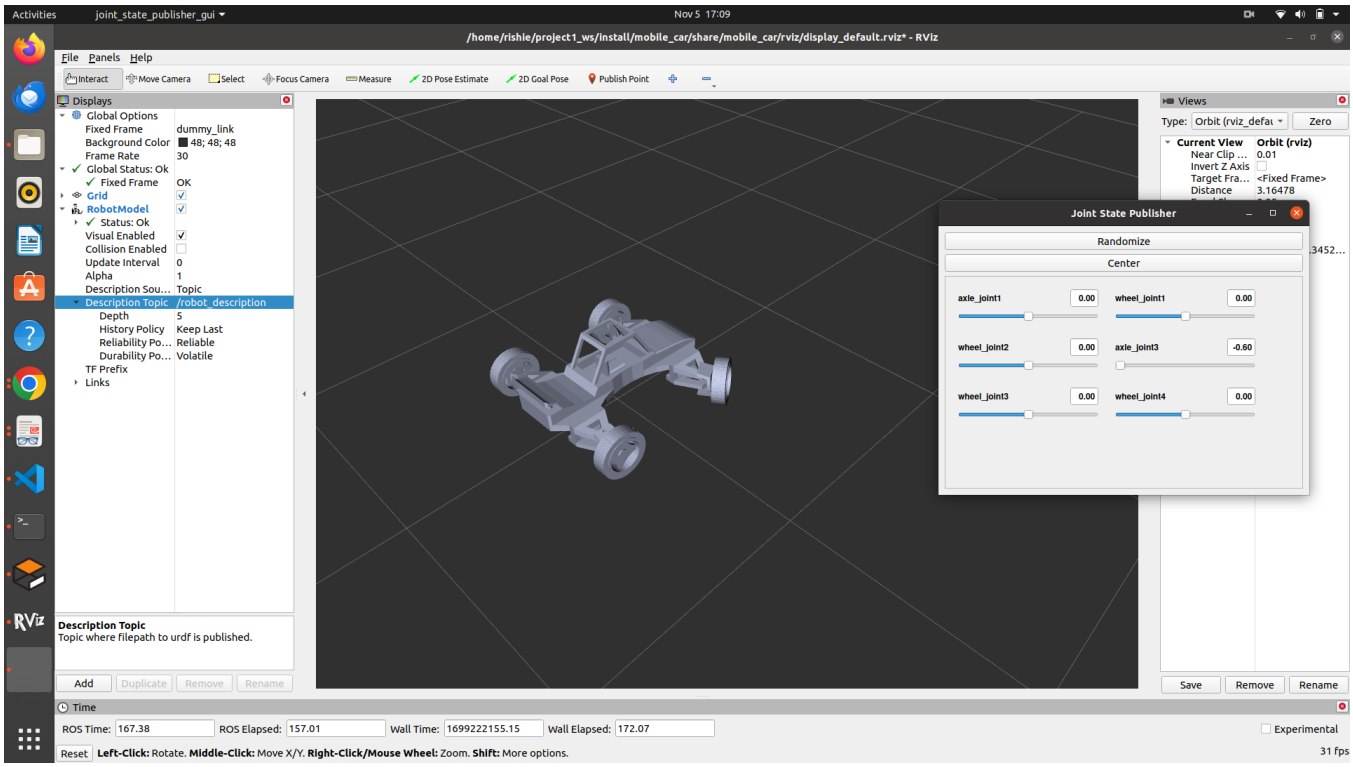
1) **Debug Launch**:



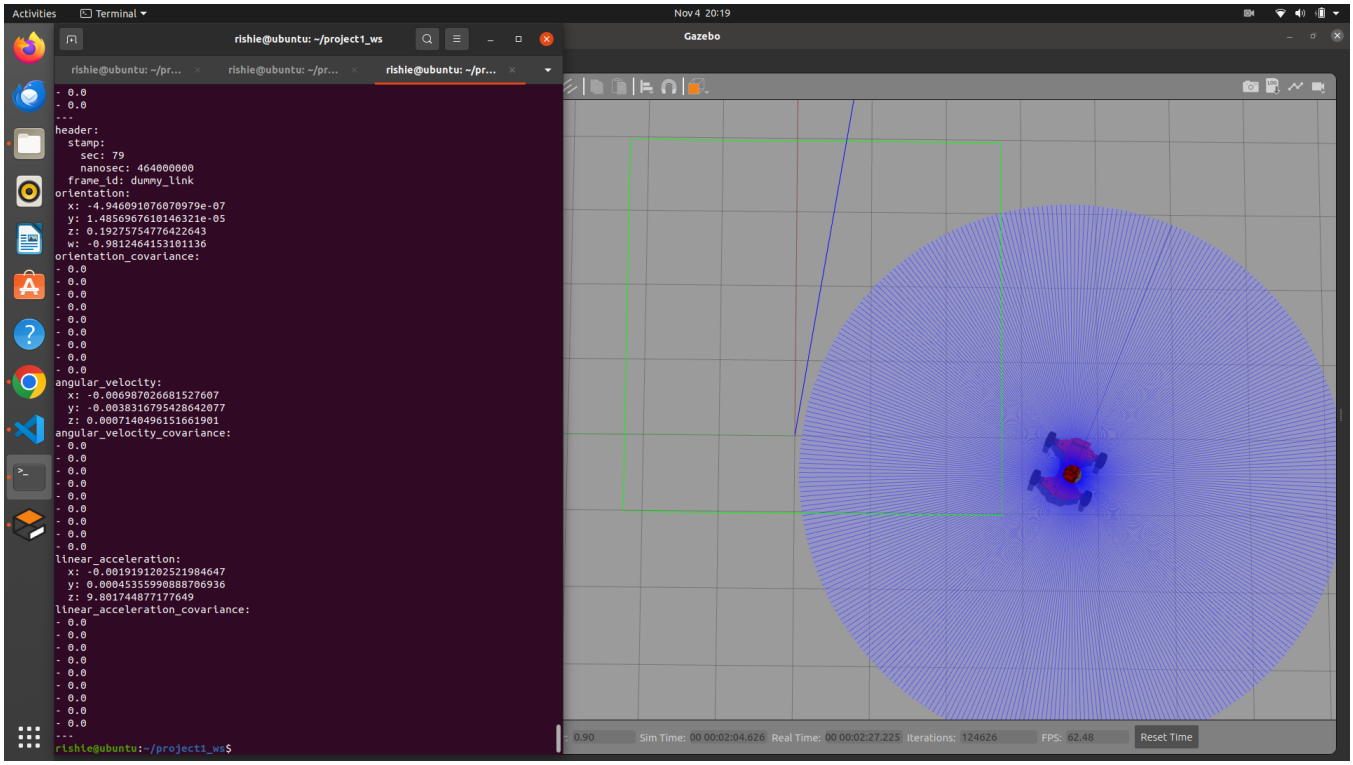
2) **Gazebo Launch**:



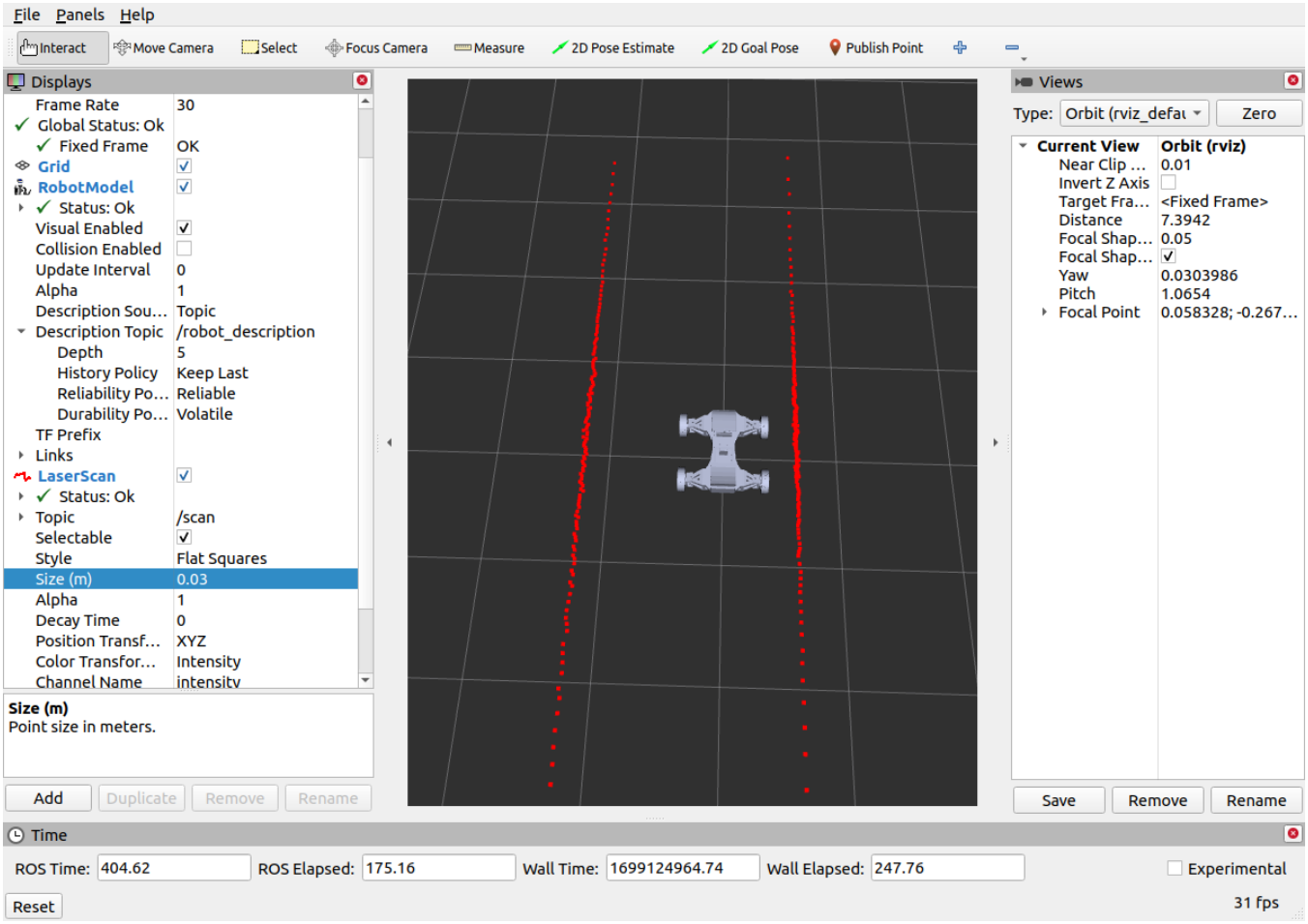
3) **Display Launch:**



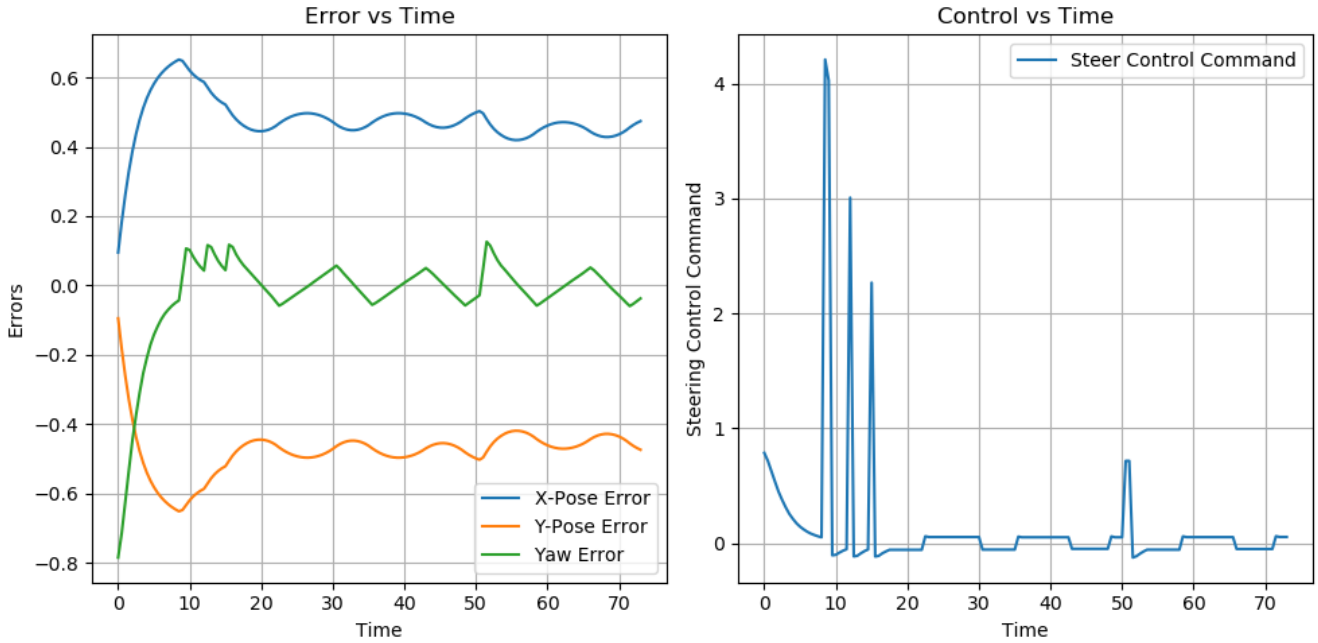
4) **IMU plugin topic visualization:**



5) **Lidar visualization:**



6) **Proportional controller:**



Improvements:

Any changes or updates done need to be mentioned in the document as a change log.