

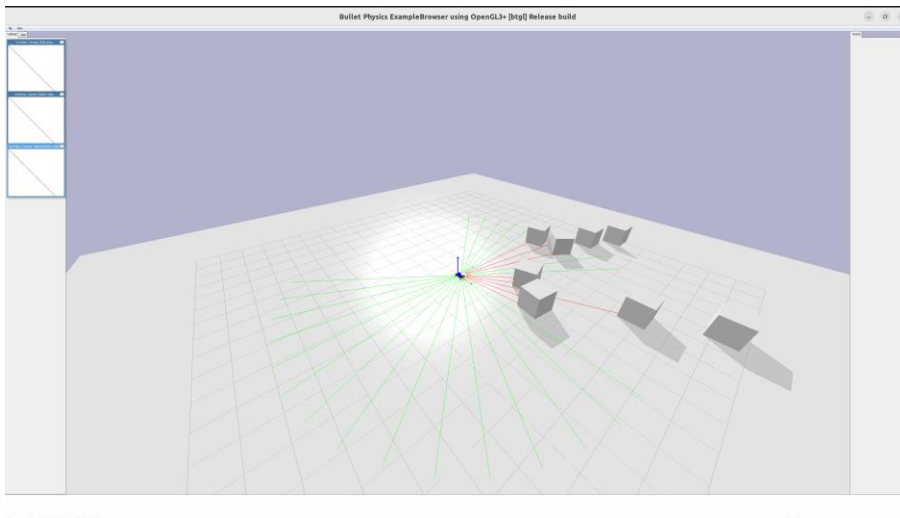
# Navigate Mobile Robot in the Pybullet Environment

## 1. Project Objective

- Get familiar with mobile robot simulation
  - You should be responsible for setting up the environment. Late submission due to this issue will not be excused.
- Understand intelligent robot programming
- Apply mobile kinematics and navigation algorithm in the simulated environment

## 2. Project Steps

1. Environment setup should be same with the project 1
2. Run `main_test.py` to test if the environment is ready for the following tasks. If the environment is set up correctly. You will see a figure like the following:



**Note: your final environment should be different that the example because you will have three different types of objects.**

3. Design three URDF files that can be used to load obstacles in the environment.
  - The first URDF file should be able to load the obstacle named “`marble_cube.obj`”, and the color of the loaded object should be white. The scale of the object should be 1 in x, y, and z axis. This urdf file should be saved in the “cube” folder.
  - The second URDF file should be able to load the obstacle named “`marble_cube.obj`”, and the color the loaded object should be black. The scale of the object should be

- 0.25, 0.25, in x, y, and 0.5 in z. This urdf file should be saved in the “cube\_black” folder.
- The third URDF file should be able to load the obstacle named “marble\_cube.obj”, and the color the loaded object should be green. The scale of the object should be 1.25,1.25, in x, y, and 0.5 in z. This urdf file should be saved in the “cube\_green” folder.
- 4. Implement a function to control the car in the main.py
- 5. Implement a function to navigate the car to the final location in the main.py
- 6. Record videos for successful trails.
  - The successful trail can pass the final position, it does not have to stop immediately reach to the final position.
  - It is okay for the robot to travel outside the boundary once or twice. However, you cannot navigate the robot outside the boundary entirely.
  - Because the maps are dynamic, the recorded videos should be different each time.

### 3. What you need to submit

- Three designed URDF files (5 points)
- Functional codes (10 points)
- Demo illustration (5 points)
  - **5 videos** that contain trails of successfully navigating the target objects. (1 points for each)
- Project Report (15 points)
  - A project report that is in academic paper format should be written for this project. (3 points)
  - The report should include:
    - Introduction (2 points)
      - Background about autonomous robots. (1 points)
      - Procedure of the project. (0.5 points)
      - Brief Summary of the project. (0.5 points)
    - Project Descriptions and Results. (5 points)
      - Describe the procedure and the applied algorithm of the project.
    - Discussion of results (3 points)
      - Discuss the results whether and why they are reasonable.
    - Conclusion (2)

- Conclude the report, mention what you have done, and what results you have got.