

## Simulation Guideline

### Source:

[OpenManipulator with TurtleBot3 Tutorial](#)

### Pre-requisites:

1. [Ubuntu OS](#)
2. Install [Python](#)
3. Install [ROS](#)
4. Install ROS Packages (See [source](#) for additional detail)
  - a. [TurtleBot](#)
  - b. [OpenManipulator](#)
  - c. [OpenManipulator with TurtleBot](#)
5. Install [MoveIt](#)
6. Download listener.py (included with project files)

### Simulation Instructions:

1. Open four terminals
2. Run “\$export TURTLEBOT3\_MODEL=waffle\_pi” in each terminal.
  - a. Alternatively, modify the .bashrc once using the following commands.
    - i. \$nano ~/.bashrc
      1. Add “export TURTLEBOT3\_MODEL=waffle\_pi” to end of file.
      2. Save and exit.
    - ii. \$source ~/.bashrc
3. Terminal 1: Launch Gazebo
  - a. \$roslaunch open\_manipulator\_with\_tb3\_gazebo rooms.launch  
use\_platform:=false
  - b. Press “Play” button before running the next command.
4. If it is the first time running the simulation, follow these sub-steps, otherwise proceed to Step 5. Create map from SLAM:
  - a. Open three new terminals, export the waffle\_pi variable name if necessary.
  - b. Terminal 5: Launch SLAM
    - i. roslaunch open\_manipulator\_with\_tb3\_tools slam.launch  
use\_platform:=true
  - c. Terminal 6: Launch Teleoperation
    - i. ROS\_NAMESPACE=om\_with\_tb3 roslaunch turtlebot3\_teleop  
turtlebot3\_teleop\_key.launch
  - d. Manually drive the robot around the virtual world. When a complete lidar map of the world has been built, then run the next command.
  - e. Terminal 7: Save Map
    - i. ROS\_NAMESPACE=om\_with\_tb3 rosrun map\_server map\_saver -f  
~/map
  - f. After the map has been saved, close all three of these terminals (5, 6, 7).
5. Terminal 2: Launch MoveIt

- a. `$roslaunch open_manipulator_with_tb3_tools rooms.launch use_platform:=false`
6. Terminal 3: Launch listener file
  - a. `$python listener.py`
7. Terminal 4: Launch Controller
  - a. `$roslaunch open_manipulator_with_tb3_tools task_controller.launch`
8. Observe simulation in Gazebo and RViz.
9. In a separate terminal, run “`$rqt`” to explore the topics, services, and other robot parameters.
10. After simulation is complete, close all windows and terminals.

Notes:

1. Pressing Ctrl+C (or Ctrl+Shift+C) in the terminal will kill any of these processes if needed.
2. Simulation data can be viewed in the two .csv files located in the same directory as the listener.py file.
  - a. Make sure to delete existing files prior to re-running the simulation again, otherwise the new data will be appended to the existing file.