

# TurtleBot3 SLAM Tutorial - ROS 2 Humble

## Step 0 — Setup

Install required packages:

```
sudo apt install ros-humble-turtlebot3-gazebo ros-humble-turtlebot3-teleop  
ros-humble-turtlebot3-cartographer ros-humble-nav2-bringup
```

Add to ~/.bashrc:

```
export TURTLEBOT3_MODEL=burger
```

## Step 1 — Spawn TurtleBot3 in Gazebo

Command:

```
ros2 launch turtlebot3_gazebo turtlebot3_world.launch.py
```

Expected: TurtleBot3 appears in Gazebo in turtlebot3\_world.

## Step 2 — Teleop Control

Command:

```
ros2 run turtlebot3_teleop teleop_keyboard
```

Control with W/A/S/D keys.

## Step 3 — Start SLAM (Cartographer)

Command:

```
ros2 launch turtlebot3_cartographer cartographer.launch.py use_sim_time:=True
```

Drive around to generate a map in RViz.

## Step 4 — Save the Map

Command:

```
ros2 run nav2_map_server map_saver_cli -f ~/map
```

This creates map.pgm and map.yaml in your home directory.

## Step 5 — Navigation (Optional)

Command:

```
ros2 launch turtlebot3_navigation2 navigation2.launch.py use_sim_time:=True  
map:=~/map.yaml
```

Use RViz to set navigation goals for autonomous movement.

## GitHub Repo Tips

- Include screenshots or gifs for each step.
- Clearly mention ROS 2 and Gazebo versions used.
- Write exact terminal commands.
- Keep steps independent for easier testing.