

TurtleBot3 Simulation

TurtleBot3 is a small, affordable, programmable, ROS-based mobile robot for use in education, research, hobby, and product prototyping. The goal of TurtleBot3 is to dramatically reduce the size of the platform and lower the price without having to sacrifice its functionality and quality, while at the same time offering expandability. The TurtleBot3 can be customized into various ways depending on how you reconstruct the mechanical parts and use optional parts such as the computer and sensor. In addition, TurtleBot3 is evolved with cost-effective and small-sized SBC that is suitable for robust embedded system, 360 degree distance sensor and 3D printing technology.

TurtleBot3 simulation

- Running TurtleBot3 simulation (launch files)
- Nodes and topics (current and needed)
- Getting laser data (python script)
- Rviz for laser data visualization
- Goal: Make TurtleBot3 to move around avoiding obstacles

1.1 Install related packages

```
$ cd ~
```

```
$ sudo apt remove ros-kinetic-turtlebot3 *
```

```
$ sudo apt-get install ros-kinetic-joy ros-kinetic-teleop-twist-joy ros-kinetic-teleop-twist-keyboard ros-kinetic-laser-proc ros-kinetic-rgbd-launch ros-kinetic-deepimage-to-laserscan ros-kinetic-rosserial-arduino ros-kinetic-rosserial-python ros-kinetic-rosserial-server ros-kinetic-rosserial-client ros-kinetic-rosserial-msgs ros-kinetic-amcl ros-kinetic-map-server ros-kinetic-move-base ros-kinetic-urdf ros-kinetic-xacro ros-kinetic-compressed-image-transport ros-kinetic-rqt-image-view ros-kinetic-gmapping ros-kinetic-navigation ros-kinetic-interactive-markers
```

1.2 Create a space for simulation

```
$ cd ~
```

```
$ mkdir -p my_turtlebot3_sim_ws / src
```

```
manal@ubuntu:~$ cd ~
manal@ubuntu:~$ mkdir -p my_turtlebot3_sim_ws/src
manal@ubuntu:~$ cd ~/my_turtlebot3_sim_ws/src
```

1.3 Clone the source code from the source

```
$ cd ~ / my_turtlebot3_sim_ws / src
```

```
$ git clone https://github.com/ROBOTIS-GIT/turtlebot3\_simulations.git
```

```
$ git clone https://github.com/ROBOTIS-GIT/turtlebot3\_msgs.git
```

```
$ git clone https://github.com/ROBOTIS-GIT/turtlebot3.git
```

```

manal@ubuntu: ~/my_turtlebot3_sim_ws/src
manal@ubuntu:~$ cd ~/my_turtlebot3_sim_ws/src
manal@ubuntu:~/my_turtlebot3_sim_ws/src$ git clone https://github.com/ROBOTIS-GIT/turtlebot3_simulations.git
Cloning into 'turtlebot3_simulations'...
remote: Enumerating objects: 2177, done.
remote: Total 2177 (delta 0), reused 0 (delta 0), pack-reused 2177
Receiving objects: 100% (2177/2177), 15.24 MiB | 97.00 KiB/s, done.
Resolving deltas: 100% (1224/1224), done.
Checking connectivity... done.
manal@ubuntu:~/my_turtlebot3_sim_ws/src$ git clone https://github.com/ROBOTIS-GIT/turtlebot3_msgs.git
Cloning into 'turtlebot3_msgs'...
remote: Enumerating objects: 242, done.
remote: Total 242 (delta 0), reused 0 (delta 0), pack-reused 242
Receiving objects: 100% (242/242), 67.03 KiB | 48.00 KiB/s, done.
Resolving deltas: 100% (101/101), done.
Checking connectivity... done.
manal@ubuntu:~/my_turtlebot3_sim_ws/src$ git clone https://github.com/ROBOTIS-GIT/turtlebot3.git
Cloning into 'turtlebot3'...
remote: Enumerating objects: 111, done.
remote: Counting objects: 100% (111/111), done.
remote: Compressing objects: 100% (86/86), done.
Receiving objects: 76% (3645/4767), 82.53 MiB | 131.00 KiB/s

```

1.4 Compile source code

```

$ cd ~/my_turtlebot3_sim_ws
$ catkin_make

```

```

manal@ubuntu:~/my_turtlebot3_sim_ws
manal@ubuntu:~/my_turtlebot3_sim_ws/src$ cd ~/my_turtlebot3_sim_ws
manal@ubuntu:~/my_turtlebot3_sim_ws$ catkin_make
Base path: /home/manal/my_turtlebot3_sim_ws
Source space: /home/manal/my_turtlebot3_sim_ws/src
Build space: /home/manal/my_turtlebot3_sim_ws/build
Devel space: /home/manal/my_turtlebot3_sim_ws/devel
Install space: /home/manal/my_turtlebot3_sim_ws/install
Creating symlink "/home/manal/my_turtlebot3_sim_ws/src/CMakeLists.txt" pointing
to "/opt/ros/kinetic/share/catkin/cmake/toplevel.cmake"
####
#### Running command: "cmake /home/manal/my_turtlebot3_sim_ws/src -DCATKIN_DEVEL
PREFIX=/home/manal/my_turtlebot3_sim_ws/devel -DCMAKE_INSTALL_PREFIX=/home/mana
l/my_turtlebot3_sim_ws/install -G Unix Makefiles" in "/home/manal/my_turtlebot3
_sim_ws/build"
####
-- The C compiler identification is GNU 5.4.0
-- The CXX compiler identification is GNU 5.4.0
-- Check for working C compiler: /usr/bin/cc
-- Check for working C compiler: /usr/bin/cc -- works
-- Detecting C compiler ABI info
-- Detecting C compiler ABI info - done
-- Detecting C compile features
-- Detecting C compile features - done
-- Check for working CXX compiler: /usr/bin/c++

```

```

manal@ubuntu:~/my_turtlebot3_sim_ws
[ 82%] Generating Javascript code from turtlebot3_example/Turtlebot3Action.msg
[ 83%] Building CXX object turtlebot3_simulations/turtlebot3_fake/CMakeFiles/tur
lebot3_fake_node.dir/src/turtlebot3_fake.cpp.o
[ 85%] Generating Javascript code from turtlebot3_example/Turtlebot3ActionGoal.m
sg
[ 87%] Generating Lisp code from turtlebot3_example/Turtlebot3Goal.msg
[ 88%] Generating Lisp code from turtlebot3_example/Turtlebot3Action.msg
[ 88%] Built target turtlebot3_example_generate_messages_nodejs
[ 90%] Generating Lisp code from turtlebot3_example/Turtlebot3ActionGoal.msg
Scanning dependencies of target turtlebot3_drive
[ 90%] Built target turtlebot3_example_generate_messages_lisp
Scanning dependencies of target turtlebot3_msgs_generate_messages
[ 90%] Built target turtlebot3_msgs_generate_messages
Scanning dependencies of target turtlebot3_diagnostics
[ 91%] Building CXX object turtlebot3/turtlebot3_bringup/CMakeFiles/turtlebot3_d
iagnostics.dir/src/turtlebot3_diagnostics.cpp.o
[ 93%] Building CXX object turtlebot3_simulations/turtlebot3_gazebo/CMakeFiles/t
urtlebot3_drive.dir/src/turtlebot3_drive.cpp.o
[ 95%] Linking CXX executable /home/manal/my_turtlebot3_sim_ws/devel/lib/turtleb
ot3_sim/flat_world_inu_node
[ 95%] Built target flat_world_inu_node
Scanning dependencies of target turtlebot3_example_generate_messages
[ 95%] Built target turtlebot3_example_generate_messages

```

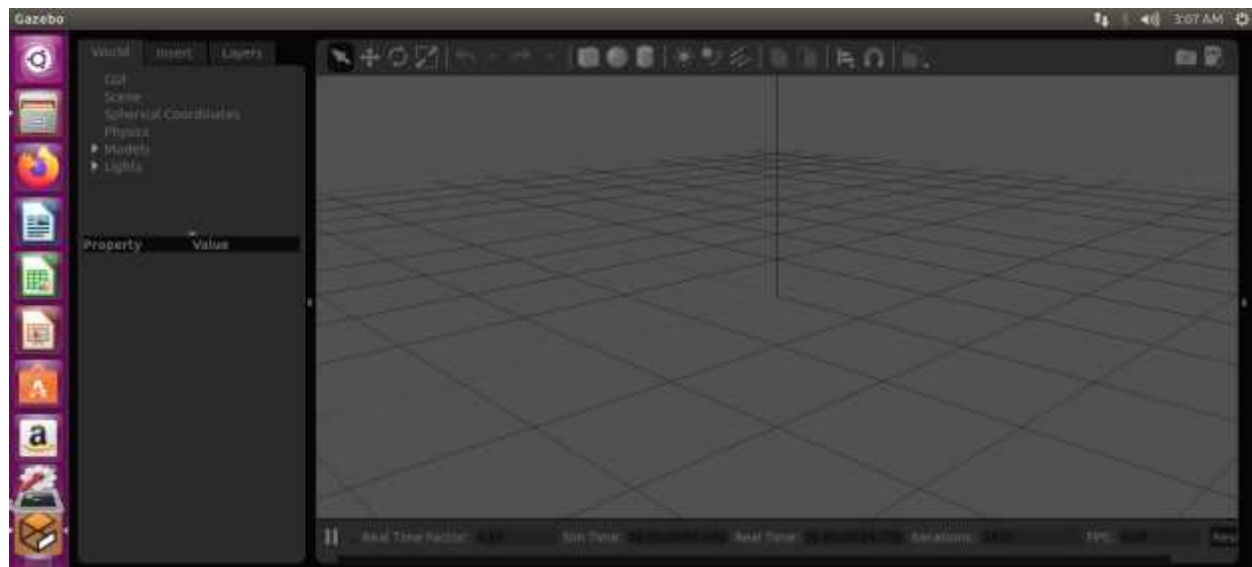
1.5 Start Simulate

```
/home/manal/my_turtlebot3_sim_ws/src/turtlebot3_simulations/turtlebot3_gazebo/laun
manal@ubuntu:~/my_turtlebot3_sim_ws$ source devel/setup.bash
manal@ubuntu:~/my_turtlebot3_sim_ws$ roslaunch turtlebot3_gazebo multi_turtlebot
3.launch
... logging to /home/manal/.ros/log/b9f31e9c-be92-11ea-ac55-000c29676d09/roslaun
ch-ubuntu-8255.log
Checking log directory for disk usage. This may take awhile.
Press Ctrl-C to interrupt
Done checking log file disk usage. Usage is <1GB.

started roslaunch server http://ubuntu:35085/

SUMMARY
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PARAMETERS
* /rostdistro: kinetic
* /rosversion: 1.12.14
* /tb3_0/robot_description: <?xml version="1...
* /tb3_0/robot_state_publisher/publish_frequency: 50.0
* /tb3_0/robot_state_publisher/tf_prefix: tb3_0
* /tb3_1/robot_description: <?xml version="1...
* /tb3_1/robot_state_publisher/publish_frequency: 50.0
* /tb3_1/robot_state_publisher/tf_prefix: tb3_1
* /tb3_2/robot_description: <?xml version="1...
```



1.5 Start Simulate (RVIZ)

```
/home/manal/catkin_ws/src/turtlebot3/turtlebot3_slam/launch/turtlebot3_slam.launch
manal@ubuntu:~/catkin_ws$ source devel/setup.bash
manal@ubuntu:~/catkin_ws$ export TURTLEBOT3_MODEL=waffle_pi
manal@ubuntu:~/catkin_ws$ roslaunch turtlebot3_slam turtlebot3_slam.launch slam_
methods:=gmapping
... logging to /home/manal/.ros/log/873e645a-bead-11ea-bae7-000c29676d09/roslaun
ch-ubuntu-4716.log
Checking log directory for disk usage. This may take awhile.
Press Ctrl-C to interrupt
Done checking log file disk usage. Usage is <1GB.

started roslaunch server http://ubuntu:39375/

SUMMARY
=====

PARAMETERS
* /robot_description: <?xml version="1....
* /robot_state_publisher/publish_frequency: 50.0
```

