



How to install ROS Kinetic and the Gazebo simulator with Turtlebot



Introduction

These instructions show how to install **Ubuntu 16.04** or one of its flavours, as well as **ROS Kinetic**, and the **Gazebo simulator** with the **Turtlebot** robot model. This will allow you to write robot programs for the Turtlebot and test them in the simulation.

The **Turtlebot** is a popular differential-drive research robot. **Gazebo** is a robot simulator for which a Turtlebot simulation exists. **ROS (Robot Operating System)** is an open source middleware and set of packages containing robot solutions and behaviours. ROS is built on top of the **Ubuntu** series of operating system distributions (which includes also **Lubuntu**, **Kubuntu**, and **Xubuntu** flavours), itself built on top of the **GNU/Linux** free and open operating system. **16.04** is the latest and also long-term support (LTS) version of the Ubuntu series.

These instructions sometimes give more than one way of installing the relevant software, and you can choose which way according to your needs. Details are given about which option should be better under which circumstance.

The instructions first discuss the installation of the Ubuntu operating system distribution, then ROS and the Turtlebot on top of that.

Step 1: Installing a relevant Ubuntu operating system distribution

OPTION A (recommended): Installation on your hard drive

If you wish to install **Kubuntu**, **Lubuntu**, **Xubuntu** or **Ubuntu** on your own computer, then go to the appropriate installation website and follow the installation instructions. The different flavours of Ubuntu are better depending on the amount of hardware available. Choose 64bit if your computer supports it. The flavours are:

- **Option A1: Kubuntu:** Windows-like, configurable, using the KDE desktop.
<http://www.kubuntu.org/getkubuntu>
- **Option A2: Lubuntu:** Light-weight, for old computers.
◦ <https://help.ubuntu.com/community/Lubuntu/GetLubuntu>
- **Option A3: Xubuntu:** Another Ubuntu variation, tending towards light-weight.
◦ <http://xubuntu.org/getxubuntu/>
- **Option A4: Ubuntu:** The parent flavour, good with tablets, with Gnome desktop.
◦ <http://www.ubuntu.com/download/desktop>

You will need either a DVD, CD or big enough USB stick depending on the distribution.

Now you are ready for step 2 (installing ROS & Turtlebot).

OPTION B (untested): Installation in a virtual machine

This option is if you do not want to directly install Ubuntu or one of its flavours onto your hard drive. Instead you will install it as a virtual machine on top of your existing operating system. This is useful if you want to run your old operating system (e.g. Mac, Windows) at the same time as Ubuntu or if you do not want to deal with installing Ubuntu directly onto your hard drive (though that should be easy enough to do).

The steps to take are:

1. Download and install VirtualBox virtualiser (you just need the "platform packages" for your operating system:

<https://www.virtualbox.org/wiki/Downloads>

2. Download the virtual machine image and load it into VirtualBox (note the user name and password for the Ubuntu login supplied on that page). If you are lucky you will find an image with ROS already on it, otherwise you need a plain ubuntu flavour image like this lubuntu one:

<http://www.osboxes.org/lubuntu/>

You should now be able to get the Ubuntu operating system running inside a virtual machine on top of your existing operating system.

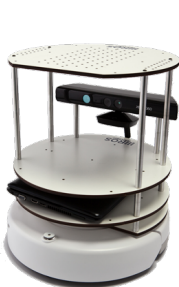
Now you are ready for step 2 (installing ROS & Turtlebot).

Step 2: Installing ROS and the Turtlebot

We have provided some scripts, along with instructions for using them, at the following link:

https://bitbucket.org/damienjadeduff/456_kinetic_turtlebot/src

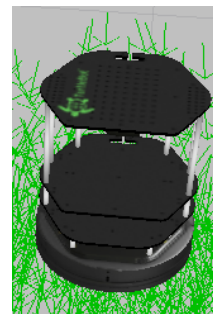
Follow the instructions under the heading: "Installing ROS and the Turtlebot Simulation in Kubuntu 16.04" (don't worry; it will work just the same with other flavours of Ubuntu as well). You will need to download the scripts, run a terminal from within Ubuntu / Kubuntu / Xubuntu / Lubuntu and type the given commands into that terminal (making sure to change the commands so that the path to the downloaded script is correct - note that on GNU Linux directories/folders are separated by forwards slashes / unlike on Windows).



*Illustration 1:
The Turtlebot
robot in real
life.*



*Illustration 2: The
Turtlebot robot as
simulated in
Gazebo.*



*Illustration 3:
The Turtlebot
as visualised in
rviz.*