

Control of Mobile Robots
Preparing the software environment for ROS labs
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This short how-to synthesises the main steps to install Ubuntu operating system, ROS, and Matlab. The same instructions can be used to install on an hard drive partition, or on an external hard drive or USB stick, or in a virtual machine.

The use of a virtual machine is not suggested, as Gazebo simulator requires a real graphic card, not an emulated one. The simulation time in case of an emulated graphic card is significantly increased.

Installing Ubuntu 18.04

Download the ISO of Ubuntu 18.04 desktop from the following link.

In order to install the operating system¹, the downloaded ISO image has to be burnt into a USB/DVD or a flash drive to boot the computer from that drive.

Boot from USB/DVD or flash drive, select “Install Ubuntu”, and follow the installation instructions. During the installation process it would be better to have an active internet connection.

When the installation process is completed, login into Ubuntu, open a Terminal and execute the following instructions (a network connection is needed)

```
sudo apt update
sudo apt upgrade
```

to check if operating system updates are available.

Installing ROS Melodic

For each Ubuntu version there is an available ROS version. In the case of Ubuntu 18.04, ROS Melodic has to be installed. To install ROS follow step-by-step the instructions on the ROS wiki. If you have no space limitations select the desktop-full installation.

In the following a synthetic version of the instructions given in the ROS wiki is reported.

Login into Ubuntu, open a Terminal and execute the following instructions:

- setup your computer to accept software from *packages.ros.org*

```
sudo sh -c 'echo "deb http://packages.ros.org/ros/ubuntu $(lsb_release -sc) main" >
/etc/apt/sources.list.d/ros-latest.list'
```

- set up your keys

```
sudo apt-key adv --keyserver 'hkp://keyserver.ubuntu.com:80'
--recv-key C1CF6E31E6BADE8868B172B4F42ED6FBAB17C654
```

- desktop-full install

```
sudo apt-get update
sudo apt install ros-melodic-desktop-full
```

- initialize rosdep

```
sudo apt install python-rosdep
sudo rosdep init
rosdep update
```

- environment setup

```
echo "source /opt/ros/melodic/setup.bash" >> ~/.bashrc
source ~/.bashrc
```

- dependencies for building packages

¹Many different tutorials can be found on the web that support the Ubuntu installation process, an example can be found here.

```
sudo apt install python-rosdep python-rosinstall python-rosinstall-generator
python-wstool build-essential
```

- create a ROS Workspace

```
mkdir -p ~/catkin_ws/src
cd ~/catkin_ws/
catkin_make
```

- before continuing, and every time you start working in a new terminal

```
source devel/setup.bash
```

- to ease working with many terminals in parallel install Terminator

```
sudo add-apt repository ppa:gnome-terminator
sudo apt-get update
sudo apt-get install terminator
```

When the installation process is completed, follow the first two to four Tutorials on the ROS wiki.

Installing Matlab

To complete the software environment setup, you should install Matlab. One of the last versions, e.g., Matlab R2020, is suggested.

To download and install Matlab follow the instructions on the online services under “ICT services - general catalog”. When the installation process is completed, follow the getting started documents:

- get started with ROS
- get started with ROS in Simulink

you can also see Mathworks webinars

- what is ROS Toolbox?
- getting started with Matlab and ROS
- getting started with Simulink and ROS
- deploying standalone ROS nodes from Simulink