

Miro MDK environment installation on Mac OS

(Version 1.0)

This instruction aims to give details about how to install Miro MDK environment on Mac OS laptop. There are main 6 steps as follows:

1. Virtual Machine installation --VMware fusion
2. Linux OS installation--Ubuntu 16.04
3. Install MDK
4. Install ROS
5. Install Gazebo
6. Simulation running and solutions to gazebo issues

1. Virtual Machine installation --VMware fusion

Our MDK is mainly developed and run on Linux operation system, in order to run it on mac OS and simultaneously use mac OS to deal with our own work, virtual machine is therefore needed. Here, we use VMware fusion 11.5.1 to do this work, which you can download by the following link: <https://my.vmware.com/web/vmware/details?downloadGroup=FUS-1151&productId=798&rPid=39198>

1.1 double click the icon to install VMware fusion 11.5.1. Enter the series number (which you need to buy one) and finish the installation.



2. Linux OS installation--Ubuntu 16.04

This step aims to install Linux system into the virtual machine that has been installed on our mac in previous step. There are many open-source Linux system, here we chose Ubuntu 16.04.(remember to use 16.04, please do not turn to high version like 18.04 because there will be some compatibility problems).

2.1 Download installation Image.

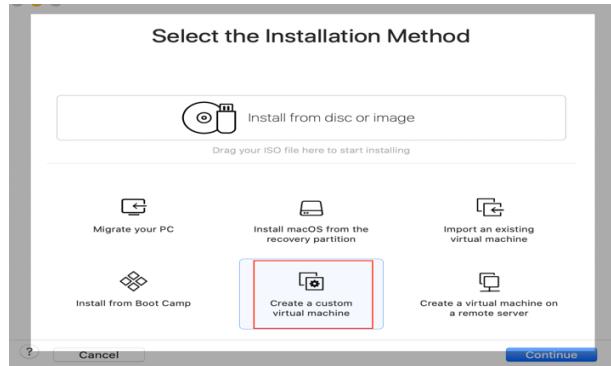
I have uploaded the Image File to google drive and shared as follows:

https://drive.google.com/drive/folders/19AjwNNvR_y3O3ag2PM69hdUIKcPAQZx3?usp=sharing

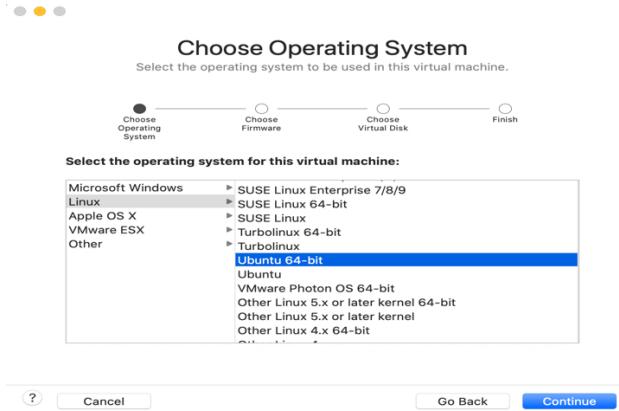
You can also download it by the link: <https://ubuntu.com/download/desktop>

2.2 Create virtual machine.

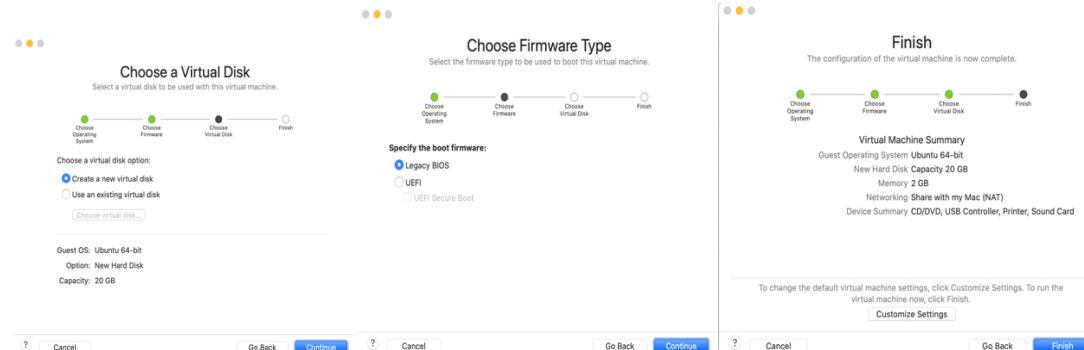
2.2.1 Open the installed VMware fusion in step 1, and chose create a custom virtual machine.



2.2.2 Choose Linux Ubuntu 64-bit



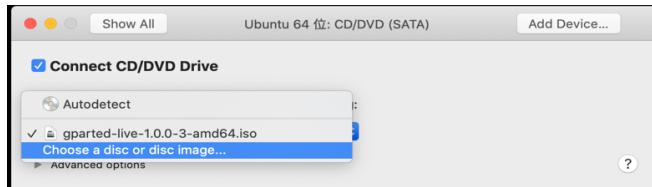
2.2.3 Continue to finish all the steps and save the virtual machine to a location on your laptop.



2.3 Install ubuntu image.

2.3.1 Open the setting of VMware and click the CV/DVD. And then chose the Image we download in step 2.1. remember to connect CD/DVD Drive.

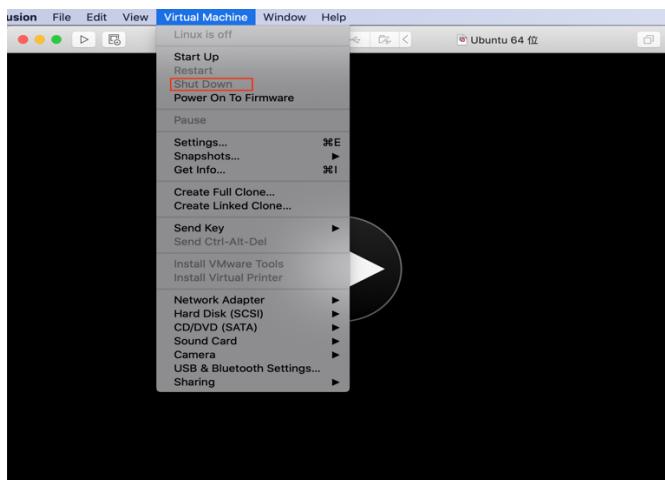




2.3.2 Then go back to the main page of VMWare and click the start-up button as follow.

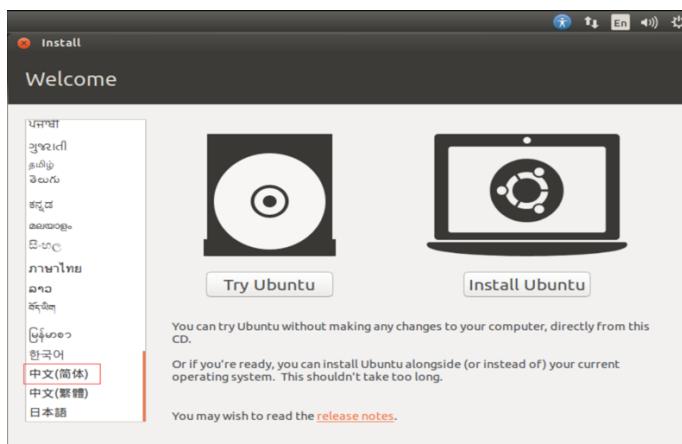


If you cannot find this page, click shut down on the menu.



2.3.3.

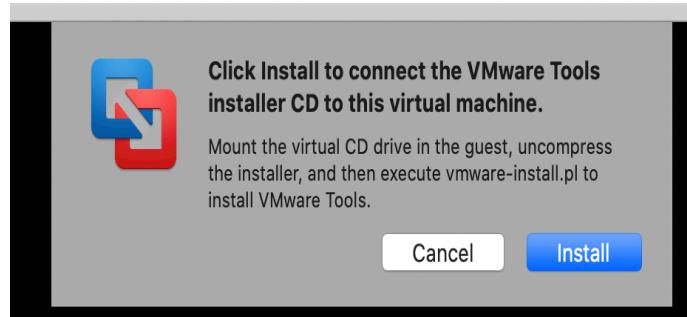
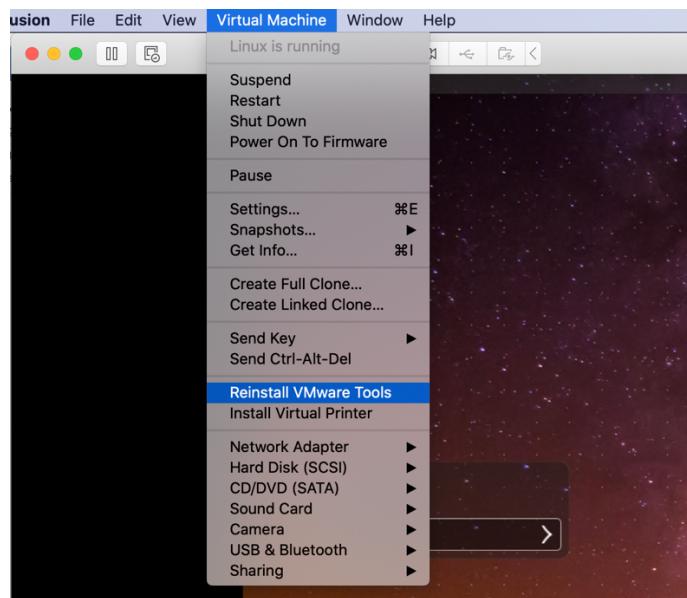
At the following page, you will see the Ubuntu installation page as normal, and finish all the steps.



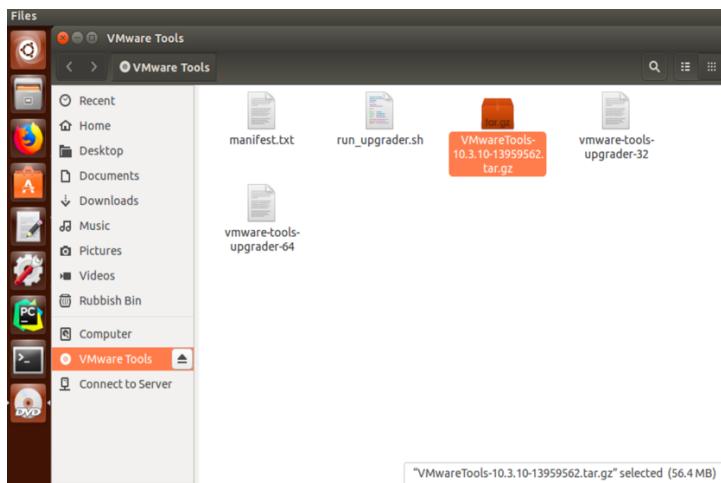
2.3.4 Config Ubuntu

After installation, you will have your own Linux system on your mac now, but there are still some problems, like your display cannot cover the full screen, (as follow) or

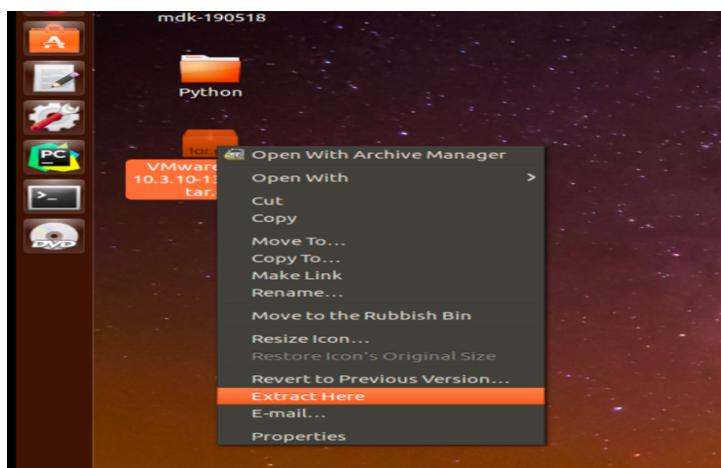
you cannot copy files from your mac to your virtual machine, therefore, we need to install VMware tools. So, click install VMware tools on the menu.



Then enter the Linux system and click VMware Tools as follows, copy the file VMwareTools-10.3..... to desktop.



Extract the file. And open terminal using `cd` command enter the location of the extracted file. Input command `sudo ./vmware-install.pl` and finish the installation.



```

fuhal@fuhai-vm: ~/Desktop/vmware-tools-distrib
MIRO edition: 2
MDK path: /home/fuhai/mdk
MDK release: R190407
User setup: /home/fuhai/.miro2/config/user_setup.bash
Network address: 192.168.30.179

Type "miro_info" to see your environment

fuhal@fuhai-vm:~$ ls
catkin_ws          mdk          sample
Desktop            MiRo         snap
Documents          Music        stereopi-tutorial-master
Downloads          opencv-3.4.1   Templates
examples.desktop   Pictures     Videos
java_error_in_PYCHARM_2459.log Public      PycharmProjects
keyboard
fuhal@fuhai-vm:~$ fuhal@fuhai-vm:~$ cd Desktop/
fuhal@fuhai-vm:~/Desktop$ ls
mdk-190518  Python  VMwareTools-10.3.10-13959562.tar.gz  vmware-tools-distrib
fuhal@fuhai-vm:~/Desktop$ cd vmware-tools-distrib/
fuhal@fuhai-vm:~/Desktop/vmware-tools-distrib$ sudo ./vmware-install.pl

```

3. Install MDK

To use some features, and depending on what is already installed on your system, you may have to add some additional packages to your system.

Run the following command to make sure these are installed, now.

```
[logged in to WORKSTATION]
$ sudo apt install python-matplotlib python-tk python-gi python-gi-cairo
```

3.1 Download the latest version of MDK using the following link. Next, create a folder named MDK and unzip the downloaded MDK to it .

<http://labs.consequentialrobotics.com/miro-e/software/>

Finally, perform the following commands to install the MDK.

```
fuhai@fuhai-vm:~$ cd mdk
fuhai@fuhai-vm:~/mdk$ ls
bin      CHANGELOG LICENSE RELEASE share
catkin_ws include README setup.bash sim
fuhai@fuhai-vm:~/mdk$ cd bin
fuhai@fuhai-vm:~/mdk/bin$ ls
arm32 deb32 deb64 script shared
fuhai@fuhai-vm:~/mdk/bin$ cd deb64/
fuhai@fuhai-vm:~/mdk/bin/deb64$ ls
install_mdk.sh libmiro_kc.so libmiro_support.a node_voice
libmiro_gazebo.so libmiro_net.a node_body README
fuhai@fuhai-vm:~/mdk/bin/deb64$ ./install_mdk.sh
```

Open a new bash terminal, and if you see text similar to that shown below, it means your installation was successful.

```
Sourcing mdk/setup.bash...
MIRO edition: 2
MDK path: /home/fuhai/mdk
MDK release: R191016
User setup: /home/fuhai/.miro2/config/user_setup.bash

Local network address: 192.168.30.179 (set from miro_get_dynamic_address())
Robot network address: (not set)
ROS master address: http://localhost:11311 (not set, assumed running locally)

Type "miro_info" to see your environment
```

4. Install ROS

The Robot Operating System (ROS) is a communications layer (amongst other things) that is popular in robotics R&D. MiRo exposes its interface to the network as a ROS node, so you will need to install ROS on your workstation in order to communicate with the robot.

Follow the instructions at ros.org to install ROS kinetic on your workstation.

You only need the base package ros-kinetic-ros-base but when working with ROS you will probably benefit from the additional tools in the -desktop package. If you only install base, you may have to add a couple of extra items, as shown below.

```
[logged in to WORKSTATION]
$ sudo apt install ros-kinetic-tf2-ros
```

After the installation, you can test it by the command **roscore**, if successful, you should be able to run the ROS and see image similar to follows:

```
[logged in to WORKSTATION]
$ roscore
...
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://192.168.1.100:41666/
ros_comm version 1.12.2

SUMMARY
=====
PARAMETERS
  * /rosdistro: kinetic
  * /rosversion: 1.12.2
```

5. Install Gazebo

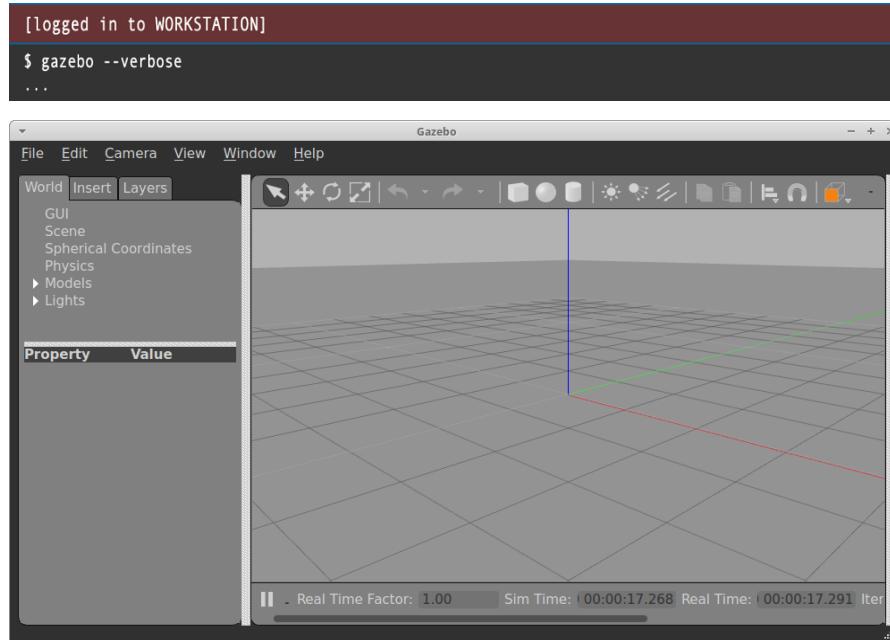
On your workstation, install the robot simulator Gazebo only if you plan to work with a simulated MiRo robot. If you plan to work with physical MiRo, you do not need the simulator.

There are many web resources that will help you to install Gazebo, but you should read the notes here before you proceed to ensure you install the correct version.

Do not install gazebo7 package, because this is not updated regularly. Instead, install ros-kinetic-gazebo-dev which provides the version that marries up with your ROS installation (at time of writing, Gazebo 7.14.0).

```
[logged in to WORKSTATION]
$ sudo apt-get install ros-kinetic-gazebo-dev
```

Restart your bash prompt and you should now be able to invoke the simulator as follows.



If the world crashed immediately after loading it, config the display of VMware and shutdown the 3D acceleration as follows:



6. Simulation running and solutions to Gazebo issues

Now you can test simulation environment of Miro by running command `./launch_sim.sh` in directory sim of your mdk location after firstly run `roscore` in terminal.

```
Fuhai@fuhai-vm: ~/mdk/sim
-----
Sourcing mdk/setup.bash...
-----
MIRO edition: 2
MDK path: /home/fuhai/mdk
MDK release: R191016
User setup: /home/fuhai/.miro2/config/user_setup.bash

Local network address: 192.168.30.179 (set from miro_get_dynamic_address())
Robot network address: (not set)
ROS master address: http://localhost:11311 (not set, assumed running locally)

Type "miro_info" to see your environment
-----
fuhai@fuhai-vm:~$ cd mdk
fuhai@fuhai-vm:~/mdk$ ls
bin  CHANGELOG  LICENSE  RELEASE  share
catkin_ws  include  README  setup.bash  sim
fuhai@fuhai-vm:~/mdk$ cd sim
fuhai@fuhai-vm:~/mdk/sim$ ./launch_sim.sh

-----
```

Gazebo

If the Miro simulation crashed after entering the command, there may be some problems of the Gazebo (Gazebo 7.0 cannot work sometimes), we should remove all the current Gazebo and add extra resource for reinstalling Gazebo

6.1 Uninstall gazebo 7.0 as follows, firstly search for the gazebo package currently installed using `dpkg -l | grep gazebo` and then remove those package by `sudo apt-get remove gazebo7 gazebo7-common gazebo7-plugin-base libgazebo7:amd64 libgazebo7-dev:amd64`

```
su@ubuntu:~$ dpkg -l | grep gazebo
ii  gazebo7                               7.4.0-1-xenial
    amd64      Open Source Robotics Simulator
ii  gazebo7-common                         7.4.0-1-xenial
    all        Open Source Robotics Simulator - Shared files
ii  gazebo7-plugin-base                   7.4.0-1-xenial
    amd64      Open Source Robotics Simulator - base plug-ins
ii  libgazebo7:amd64                      7.4.0-1-xenial
    amd64      Open Source Robotics Simulator - shared library
ii  libgazebo7-dev:amd64                  7.4.0-1-xenial
    amd64      Open Source Robotics Simulator - Development Files
```

6.2 Using the following command to add resource.

```
sudo sh -c 'echo "deb http://packages.osrfoundation.org/gazebo/ubuntu-stable
`lsb_release -cs` main" > /etc/apt/sources.list.d/gazebo-stable.list'
```

```
wget http://packages.osrfoundation.org/gazebo.key -O - | sudo apt-key add -
```

6.3 Input `sudo apt-get update` and reinstall Gazebo again.