

第二章 安裝 KUBOT_ROS

本章將說明 ROS 系統並透過遠端電腦可啟動 KUBOT 小車的相關功能。需要一台可遠端的 Linux 電腦或具有虛擬機並灌好 Linux 相關作業環境之電腦(筆者使用 Ubuntu 18.04) , 亦或是透過 Xshell 等軟體。

在進入本章節前，需使用祥儀提供的系統，並於雲端下載好所需驅動包與更新檔。
非祥儀的系統在後續會有諸多問題。

事前準備：

1. 充好電的 KUBOT ROS 小車一台
2. Linux 環境之電腦一台 (需連接外網)
3. 下載好 KUBOT_package 驅動包 (放在 Document)。
4. [安裝好 ROS](#) 目前僅支援 melodic

2-在遠端電腦上建立 kubot2_ros

Setp.1 確保電腦能夠連結外網，並安裝好 git 相關工具包：

```
git clone https://github.com/kubot080301/kubot2_ros.git
```

接著進到該空間：

```
cd kubot2_ros
```

閱讀 REDERME.

閱讀 LICENSE

首先進行安裝 ROS，確保 KUBOT 小車需要的驅動包都已安裝，此時需連接外網。

執行:

```
cd /kubot2_ros/tools
```

```
./kubot_install_ros.sh
```

若網路穩定，便會自動安裝 ROS。

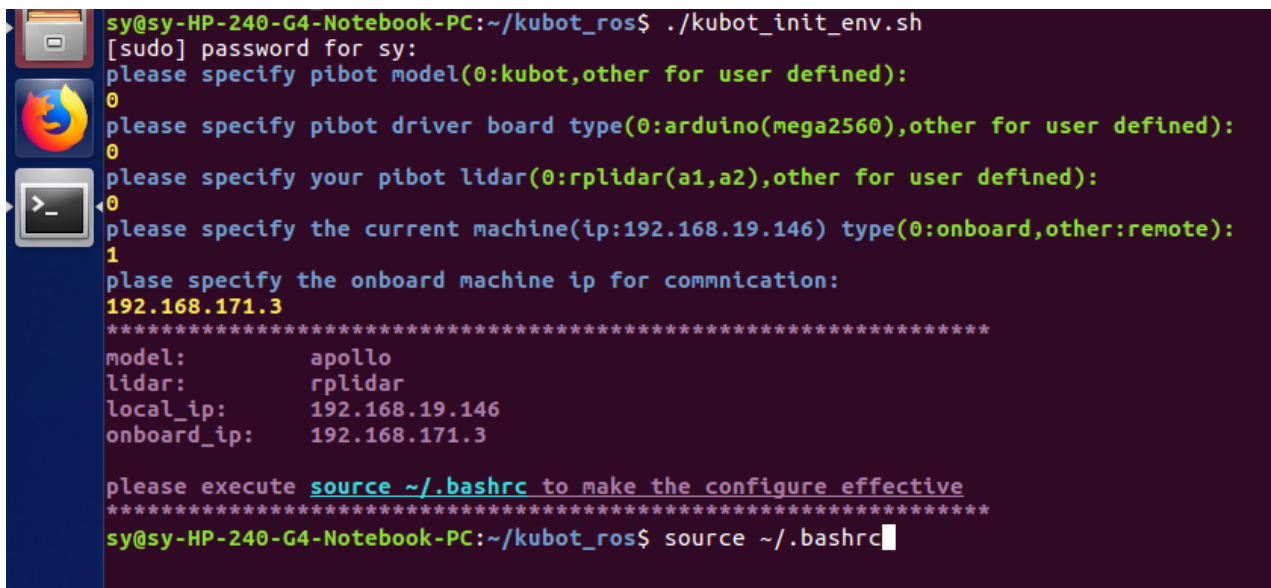
```
sudo apt - get update
```

接著設定小車環境，執行：

```
./kubot_init_env.sh
```

會看到幾個問題，選擇 KUBOT2(1)、arduino(mega2560)(0)、rplidar a1(0)、選擇電腦端(1) (若是在小車端則選擇車端 master(0))，電腦端需設定欲遠端的小車 IP，192.168.....，輸入完成後進行 source 更新代碼。

```
source ~/. bashrc
```



```
sy@sy-HP-240-G4-Notebook-PC:~/kubot_ros$ ./kubot_init_env.sh
[sudo] password for sy:
please specify piBot model(0:kubot,other for user defined):
0
please specify piBot driver board type(0:arduino(mega2560),other for user defined):
0
please specify your piBot lidar(0:rplidar(a1,a2),other for user defined):
0
please specify the current machine(ip:192.168.19.146) type(0:onboard,other:remote):
1
please specify the onboard machine ip for commnication:
192.168.171.3
*****
model:      apollo
lidar:      rplidar
local_ip:   192.168.19.146
onboard_ip: 192.168.171.3

please execute source ~/.bashrc to make the configure effective
*****
sy@sy-HP-240-G4-Notebook-PC:~/kubot_ros$ source ~/.bashrc
```

若您的電腦並非使用 bashell，請修改 kubot_init_env.sh 內，將所有 bashrc、setup.bash 全部改成您的 shell。

接著設定工作空間：

```
cd ros_ws
```

KUBOT

用戶手冊

catkin_make

```
sy@sy-HP-240-G4-Notebook-PC: ~/kubot_ros/ros_ws
[ 77%] Built target simple_follower_generate_messages_eus
[ 77%] Building CXX object pibot_bringup/CMakeFiles/pibot_driver.dir/src/base_driver.cpp.o
[ 79%] Building CXX object pibot_bringup/CMakeFiles/pibot_driver.dir/src/data_holder.cpp.o
[ 80%] Building CXX object pibot_bringup/CMakeFiles/pibot_driver.dir/src/simple_dataframe_master.cpp.o
[ 81%] Building CXX object pibot_bringup/CMakeFiles/pibot_driver.dir/src/serial_transport.cpp.o
Scanning dependencies of target Mahony_filter
[ 82%] Building CXX object imu_filter/Mahony_filter.dir/src/Mahony_filter.cpp.o
Scanning dependencies of target bias_calculator
[ 83%] Building CXX object imu_filter/bias_calculator.dir/src/bias_calculator.cpp.o
[ 84%] Linking CXX executable /home/sy/kubot_ros/ros_ws/devel/lib/filter/Madgwick_filter
[ 84%] Built target Madgwick_filter
Scanning dependencies of target imu_filter
[ 86%] Building CXX object imu_filter/madgwick/CMakeFiles/imu_filter.dir/src/imu_filter.cpp.o
[ 87%] Building CXX object imu_filter/madgwick/CMakeFiles/imu_filter.dir/src/imu_filter_ros.cpp.o
[ 88%] Linking CXX executable /home/sy/kubot_ros/ros_ws/devel/lib/pibot_bringup/pibot_driver
[ 88%] Built target pibot_driver
Scanning dependencies of target arbotix_msgs_generate_messages
[ 88%] Built target arbotix_msgs_generate_messages
Scanning dependencies of target pibot_msgs_generate_messages
[ 88%] Built target pibot_msgs_generate_messages
Scanning dependencies of target pibot_imu
[ 89%] Building CXX object pibot_imu/CMakeFiles/pibot_imu.dir/src/pibot_imu.cpp.o
[ 90%] Linking CXX executable /home/sy/kubot_ros/ros_ws/devel/lib/filter/bias_calculator
[ 90%] Built target bias_calculator
Scanning dependencies of target simple_follower_generate_messages
[ 90%] Built target simple_follower_generate_messages
[ 90%] Building CXX object imu_filter/madgwick/CMakeFiles/imu_filter.dir/src/stateless_orientation.cpp.o
[ 91%] Building CXX object pibot_imu/CMakeFiles/pibot_imu.dir/src/pibot_imu_node.cpp.o
[ 93%] Linking CXX executable /home/sy/kubot_ros/ros_ws/devel/lib/filter/Mahony_filter
[ 93%] Built target Mahony_filter
[ 94%] Linking CXX executable /home/sy/kubot_ros/ros_ws/devel/lib/pibot_imu/pibot_imu
[ 94%] Built target pibot_imu
[ 95%] Linking CXX shared library /home/sy/kubot_ros/ros_ws/devel/lib/libimu_filter.so
[ 95%] Built target imu_filter
Scanning dependencies of target imu_filter_node
Scanning dependencies of target imu_filter_nodelet
[ 96%] Building CXX object imu_filter/madgwick/CMakeFiles/imu_filter_node.dir/src/imu_filter_node.cpp.o
[ 97%] Building CXX object imu_filter/madgwick/CMakeFiles/imu_filter_nodelet.dir/src/imu_filter_nodelet.cpp.o
[ 98%] Linking CXX executable /home/sy/kubot_ros/ros_ws/devel/lib/imu_filter_madgwick/imu_filter_node
[ 98%] Built target imu_filter_node
[100%] Linking CXX shared library /home/sy/kubot_ros/ros_ws/devel/lib/libimu_filter_nodelet.so
[100%] Built target imu_filter_nodelet
sy@sy-HP-240-G4-Notebook-PC:~/kubot_ros/ros_ws$
```

完成後，再更新一次代碼。

```
source ~/.bashrc
```

便可享受小車的各項執行檔。

2-2 更新代碼(遠端電腦)

如果您是直接燒入 KUBOT 鏡像並使用祥儀提供的車端控制器，可以直接使用。

Setp.1 連上對外網路。

Setp.2 接著進到該工作空間：

```
cd kubot2_ros
```

透過 git 更新代碼

```
git pull
```

接著重複

```
./kubot_init_env.sh
```

```
source ~/.bashrc
```

```
cd ros_ws
```

```
catkin_make
```

```
source ~/.bashrc
```

2-3 更新車端電腦

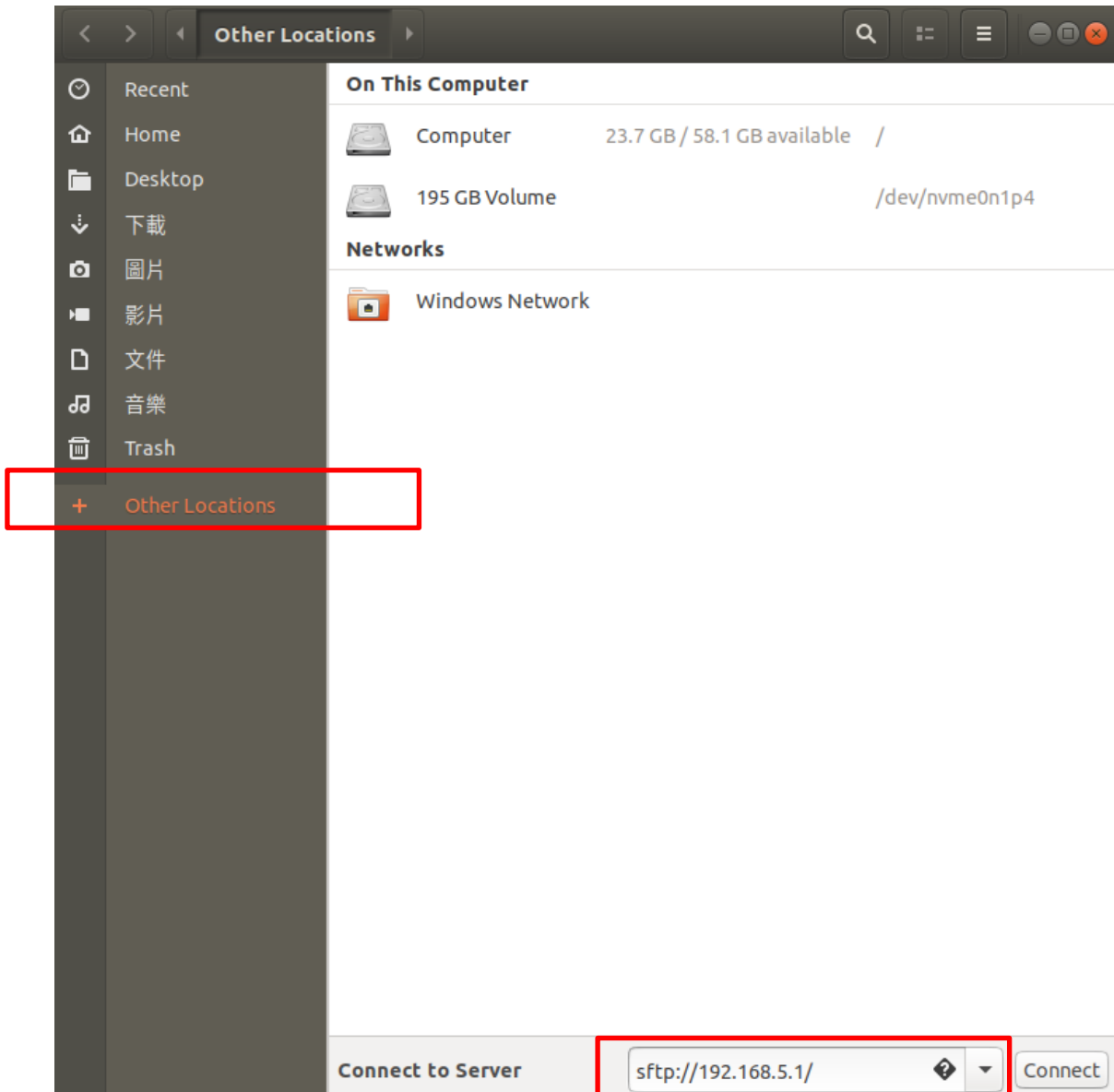
Setp.1 連線到車端開啟的 wifi。

Setp.2 打開終端機建立 ssh 連線。

```
ssh kubot@192.168.172.1
```

Setp.3 打開檔案，選擇遠端設備(Other Locations)進行遠端連線

```
sftp://192.168.172.1/
```



接著找到遠端的 kubot2_ros 資料夾，直接把本地的複製過去蓋掉。

蓋掉後 cd kubot2_ros/ros_ws/

把 src 以外的資料夾刪掉，重新執行

```
./kubot_init_env.sh
```

```
source ~/.bashrc
```

```
cd ros_ws
```

```
catkin_make
```

```
source ~/.bashrc
```

記得，車端的最後一個選項選擇車端 **master(0)**，而自己的電腦則是 **slave(1)**。

可以輸入 kubot 透過 TAB 鍵看功能快速鍵，此版本的功能表如下：

限 遠 端	限 車 端	快速指令集	說明	備註	階層
	✓	kubot_bri	底層驅動		1
	✓	kubot_bri_imu	底層驅動+imu		1
	✓	kubot_lidar	啟動 LIDAR		1
		kubot_key	鍵盤控制	需搭配建圖或底層	2
✓		kubot_rqt	rqtconfig 動態參數調整	需搭配底層	2
	✓	kubot_gmp	gmapping		1
	✓	kubot_gmp_imu	gmapping+imu		1
	✓	kubot_save_map	保存地圖編號 001	需搭配 gmapping	2
	✓	kubot_nav001	導航 啟動地圖 001		1
	✓	kubot_nav001_imu	導航 啟動地圖 001 + imu		1
	✓	kubot_set_a	設定多點導航 A	Vim 編輯器	1
	✓	kubot_nav_a	多點導航 A	需搭配 gmp 或 nav	2
	✓	kubot_set_b	設定多點導航 B	Vim 編輯器	1
	✓	kubot_nav_b	多點導航 B	需搭配 gmp 或 nav	2
	✓	kubot_nav	導航 啟動地圖		1
	✓	kubot_na_imu	導航 啟動地圖 + imu		1
✓		kubot_view	RViZ	僅能在遠端電腦起	3
		kubot_linear	直線調整	需搭配底層驅動	2
		kubot_angular	旋轉角調整	需搭配底層驅動	2
	✓	kubot_pp_gmp	gmapping+imu		1
	✓	kubot_pp_smp	保存地圖編號 001	與 save_map 不共用	2
	✓	kubot_pp_poi	設定多點導航站點	參考 point 座標	1
	✓	kubot_pp_nav	基於編號 001 多點導航	需搭配 pp_nav	1
	✓	kubot_one	Gmapping+imu+cam		1

該功能短指令的宣告在 kubot_init_env.sh 最後的 alias 設定，具體可以看下源碼。