智慧機器人V12

使用手冊

目錄

註：6、7、8項操作為基本使用方法
進階操作或相關課程
請洽創客萊吧 Makerlab
電話：07 – 5564686
官網：https://www.makerlab.tw/

1.智慧機器人組件

無線通訊
擁有wifi與藍芽

搭載ROS系統
使用強大的機器人操作系統

電源管理
Ominibot 馬達控制版提拱 兩組 5V/4A的電源埠

影像辨識
能夠於線道中自動駕駛

2.智慧機器人系統資訊

作業系統、帳號名稱與密碼

- 作業系統：Ubuntu-mate 16.04
- 預設帳號與主機名稱
  - ubuntu@smartrobot
- 預設密碼
  - 創客萊吧之電話號碼：5564686

3.注意事項

良好的使用方法有助於延長使用時間

單板電腦 – 樹梅派 3B

常插拔的兩個地方需要小心謹慎

1. Micro USB 電源供應孔
2. HDMI 螢幕孔

馬達控制器

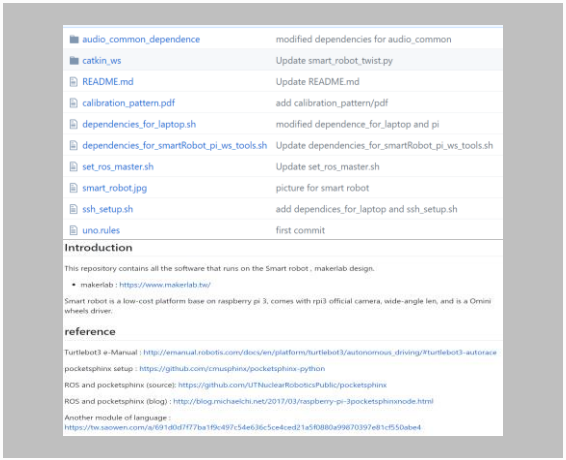
未使用智慧機器人時，請記得將所有電源關閉(確保未有指示燈亮起)，以延長鋰電池使用期限

鋰電池與充電器

充電時需有人在現場檢視，充電完畢需即時停止充電禁止於夜晚充電至隔天早上

4.技術資源

創客萊吧 Makerlab 已於 github 開放原始碼 ：https://github.com/kjoelovelife/smart_robot



audio_common_dependence	modified dependencies for audio_common
catkin_ws	Update smart_robot_twist.py
README.md	Update README.md
calibration_pattern.pdf	add calibration_pattern/pdf
dependencies_for_laptop.sh	modified dependence_for_laptop and pi
dependencies_for_smartRobot_pi_ws_tools.sh	Update dependencies_for_smartRobot_pi_ws_tools.sh
set_ros_master.sh	Update set_ros_master.sh
smart_robot.jpg	picture for smart robot
ssh_setup.sh	add dependices_for_laptop and ssh_setup.sh
uno.rules	first commit

Introduction

This repository contains all the software that runs on the Smart robot , makerlab design.

- makerlab : https://www.makerlab.tw/

Smart robot is a low-cost platform base on raspberry pi 3, comes with rpi3 official camera, wide-angle len, and is a Omini wheels driver.

reference

Turtlebot3 e-Manual : http://emanual.robotis.com/docs/en/platform/turtlebot3/autonomous_driving/#turtlebot3-autorace

pocketsphinx setup : https://github.com/cmusphinx/pocketsphinx-python

ROS and pocketsphinx (source): https://github.com/UTNuclearRoboticsPublic/pocketsphinx

ROS and pocketsphinx (blog) : http://blog.michaelchi.net/2017/03/raspberry-pi-3pocketsphinxnode.html

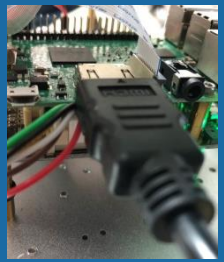
Another module of language :
https://tw.saowen.com/a/691d0d7f77ba1f9c497c54e636c5ce4ced21a5f0880a99870397e81cf550abe4

讓你能夠更方便地使用智慧機器人

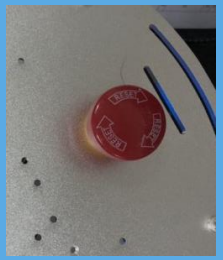
IcShop 將需要使用到的知識與技術，
通通幫你整合在開放的 github上，
讓你使用起來更加方便

5.智慧機器人電源啟動順序

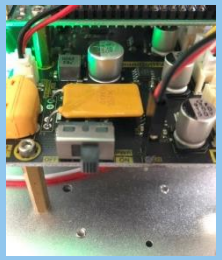
使用智慧機器人前的預備動作



1. 樹莓派接入 HDMI螢幕線與螢幕連線



2. 確保緊急按鈕為拉起狀態



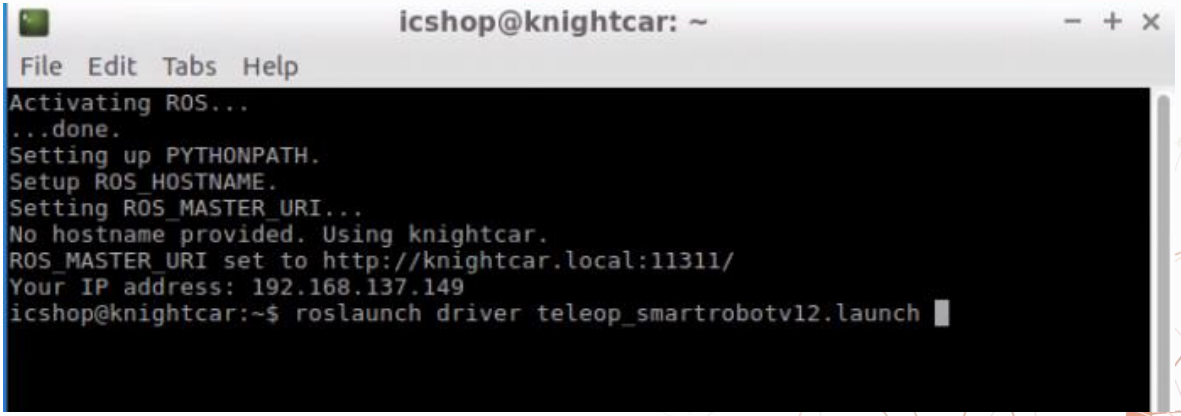
3. 將 Ominibot 馬達控制版電源開啟

6、鍵盤遙控智慧機器人

6-1 執行 

文件檔案

指令：roslaunch driver teleop_smartrobotv12.launch

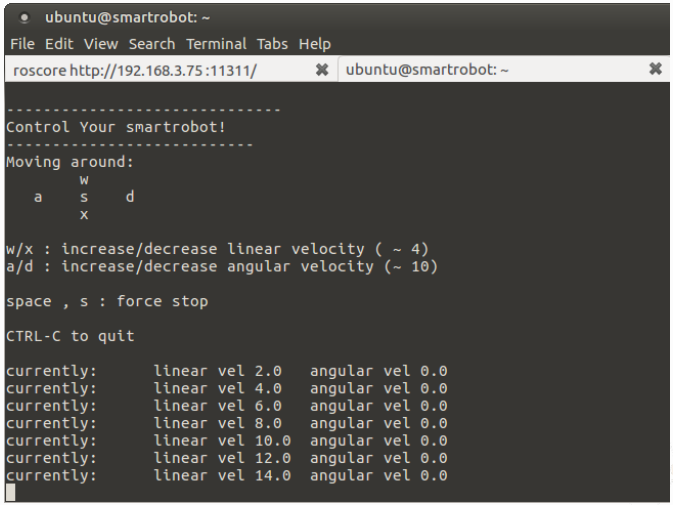


6、鍵盤遙控智慧機器人

6-2 在執行 

節點的 Terminal，按下 w/x/s/a/d

即可移動智慧機器人

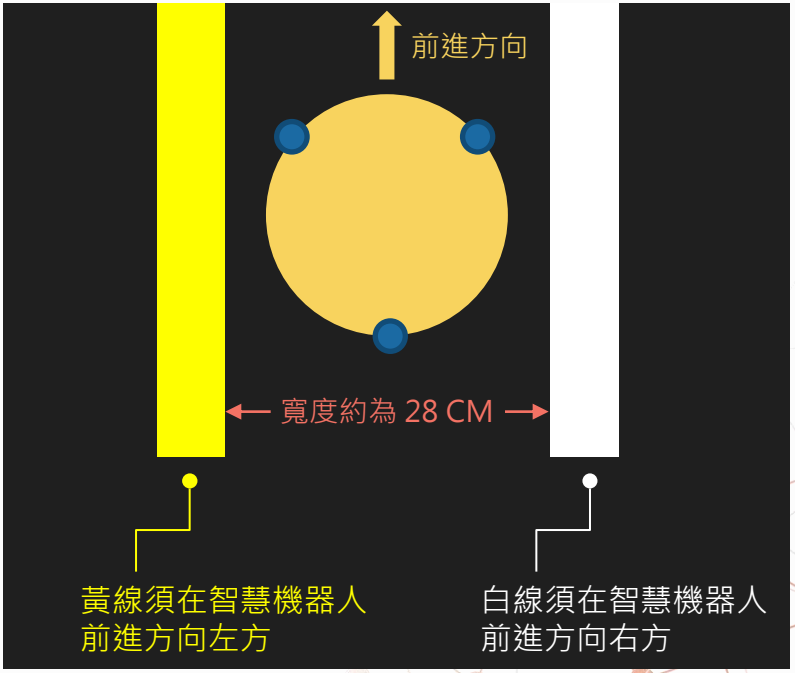


按鍵	移動方向
W	前進
X	後退
A	逆時針旋轉
D	順時針旋轉
S	停止

7、智慧機器人影像辨識道路

7-1 準備好地圖與智慧機器人

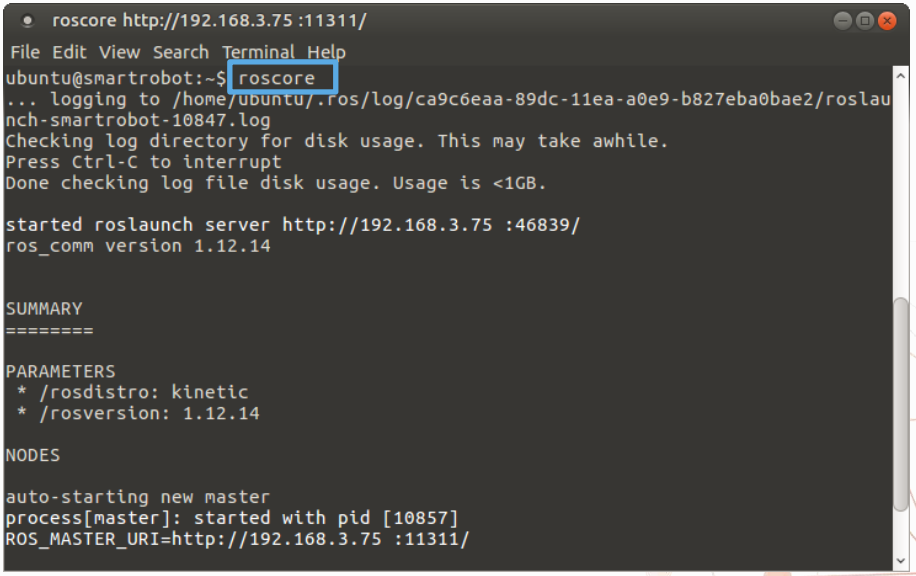
地圖底色須為深色
(黑色最佳)



7、智慧機器人影像辨識道路

7-2 註冊 Master

指令： roscore



7、智慧機器人影像辨識道路

7-3 執行  文件

turtlebot3_autorace_detect_lane_intrinsic.launch

指令： roslaunch turtlebot3_autorace_camera turtlebot3_autorace_detect_lane_intrinsic.launch

```
/home/ubuntu/smart_robot/catkin_ws/src/turtlebot3_autorace/turtlebot3_autorace_camera/launch/turtlebot3_autorace
File  Edit  View  Search  Terminal  Tabs  Help
roscore http://192.168.3.75:11311/ ✖ | /home/ubuntu/smart_robot/catkin_ws/... ✖ | ubuntu@smartrobot: ~ ✖
ubuntu@smartrobot:~$ roslaunch turtlebot3_autorace_camera turtlebot3_autorace_detect_lane_intrinsic.launch
... logging to /home/ubuntu/.ros/log/65f8a8c2-89de-11ea-b8de-b827eba0ba82/roslaunch-smartrobot-2857.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://192.168.3.75 :36876/

SUMMARY
========

PARAMETERS
 * /camera/camera/ISO: 244
 * /camera/camera/awb_mode: tungsten
 * /camera/camera/brightness: 78
 * /camera/camera/contrast: 11
 * /camera/camera/exposureCompensation: 0
 * /camera/camera/exposure_mode: antishake
 * /camera/camera/hFlip: False
 * /camera/camera/saturation: 37
 * /camera/camera/sharpness: 34
 * /camera/camera/shutterSpeed: 10000
 * /camera/camera/vFlip: False
 * /camera/camera/videoStabilisation: False
```

7、智慧機器人影像辨識道路

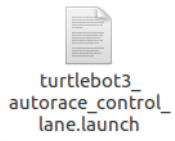
7-4 執行  文件

turtlebot3_autorace_control_lane.launch

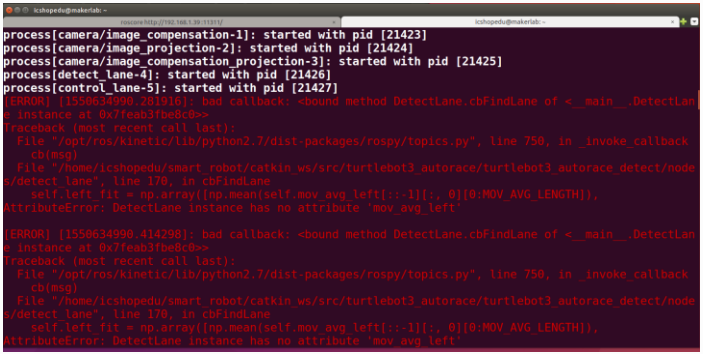
指令： roslaunch turtlebot3_autorace_control turtlebot3_autorace_control_lane.launch

```
ubuntu@smartrobot: ~
File  Edit  View  Search  Terminal  Tabs  Help
roscore http://192.168.3.75:11311/   /home/ubuntu/smart_robot/catkin_ws/...   ubuntu@smartrobot: ~
ubuntu@smartrobot:~$ roslaunch turtlebot3_autorace_control turtlebot3_autorace_control_lane.launch
... logging to /home/ubuntu/.ros/log/65f8d8c2-89dc-11ea-b8dc-b827eb8b8ac2/roslaunch-smartrobot-3444.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://192.168.3.75 :36809/

SUMMARY
========

PARAMETERS
 * /camera/image_compensation/camera/extrinsic_camera_calibration/clip_hist_percent: 8.0
 * /camera/image_compensation/is_extrinsic_camera_calibration_mode: False
 * /camera/image_compensation_projection/camera/extrinsic_camera_calibration/clip_hist_percent: 8.0
 * /camera/image_compensation_projection/is_extrinsic_camera_calibration_mode: False
 * /camera/image_projection/camera/extrinsic_camera_calibration/bottom_x: 273
 * /camera/image_projection/camera/extrinsic_camera_calibration/bottom_y: 130
 * /camera/image_projection/camera/extrinsic_camera_calibration/top_x: 103
 * /camera/image_projection/camera/extrinsic_camera_calibration/top_y: 66
 * /camera/image_projection/is_extrinsic_camera_calibration_mode: False
 * /desired_center: 200
 * /detect_lane/detect/lane/white/hue_h: 179
 * /detect_lane/detect/lane/white/hue_l: 0
```

7、智慧機器人影像辨識道路

7-4-1 執行 

文件出現紅字



若是出現紅色字體
表示智慧機器人不在正確的線道上
請回到 7-1 步驟
確認地圖與智慧機器人擺放位置是否正確
若擺放正確則紅色字體不會再被刷新

7、智慧機器人影像辨識道路

7-5 執行  節點，開始移動

smart_robot_twist.py

指令：rosrun driver smart_robot_twist_omnibotV12.py

7、智慧機器人影像辨識道路

7-6 修改 

參數，調整影像辨識道路行進路線

位置：smart_robot | catkin_ws | src | turtlebot3_autorace | turtlebot3_autorace_control | param | **control_lane**

automove.yaml (~/smart_robot/catkin_ws/src/turtlebot3_auto...tlebot3_autorace_control/param/control_lane

Open Save

```
kp: 0.0001 # default:0.0001   , range 0.00001 ~ 0.0025
kd: 0.0007  # default:0.007   , range 0.001 ~ 0.0001
y_max_speed: 30 # default:30 , range 0 ~ 126
z_max_speed: 40 # default:40 , range 0 ~ 126
desired_center: 200 # default:500 , range: 0 ( yellow ) ~ 599 ( white )
```