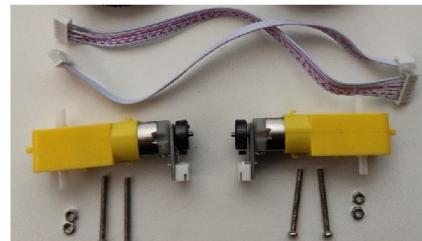
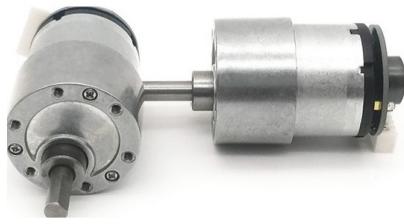
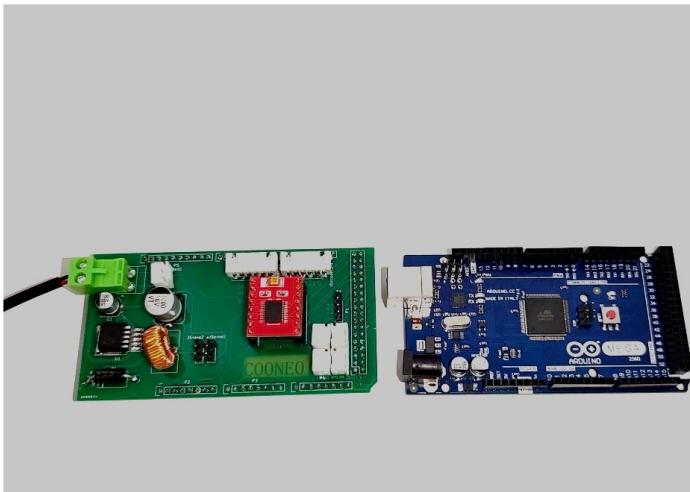


Arduino_Raspberry_ROS_Car Tutorials



chapter 1: Construction A ROS Car



(TB6612FNG 版本)



C O O N E O

(A4950T 版本)

Download codes from Git:

```
git clone https://github.com/COONEO/Arduino_Raspberry_ROS_Car.git
```

Step One: Download programs for Arduino Mega 2560

Install Arduino IDE in your computer and add library where in
Arduino_mega_2560_code/relative_library folder.than,download the code into your
Arduino_mega_2560 board.

```
RobotPIDDriver  MakeMe2ndChassis.cpp  MakeMe2ndChassis.h  commands.h  encoder_driver.h  encoder_driver  motor_driver.h  motor_driver  sensors.h  servos.h
1 #include "encoder_driver.h"
2 #include "motor_driver.h"
3 #include "make442ndChassis.h"
4 #include "commands.h"
5 #include <PID_v1.h>
6
7 typedef struct
8{
9    double target;
10   double currentEncoder;
11   double lastEncoder;
12   double error;
13   double integral;
14   double output;
15 } PIDInfo;
16 PIDInfo leftInfo, rightInfo;
17
18 //车轮直径
19 double wheelDiameter = 0.064; //车轮直径
20 double encoderResolution = 2496.0; //编码器输出脉冲数/圈 13*2*48*2 = 2496
21
22 //PID参数配置
23 double Kp_L = 2.0, Ki_L = 5.0, Kd_L = 0.003; //2.0 5.0 0.003
24 double Kp_R = 2.0, Ki_R = 5.0, Kd_R = 0.003; //2.0 5.0 0.003
25 double Sum_count_L = 0;
26 double Sum_count_R = 0;
27
28
29 //左PID
30 void leftPID(SleftInfo.input, SleftInfo.output, SleftInfo.target, Kp_L, Ki_L, Kd_L, DIRECT);
31 //右PID
32 void rightPID(SrightInfo.input, SrightInfo.output, SrightInfo.target, Kp_R, Ki_R, Kd_R, DIRECT);
33
34 double pidInterval = 1000.0 / pid_rate; // PID每次运算结束的执行时间
35 long nextTime;
36 int moving;
37
38 // A pair of variables to help parse serial commands (thanks Fergs)
39 int arg = 0;
40 int index = 0;
41
42 // Variable to hold an input character
```

ps:新增了适配我们Arduino扩展板的程序，见文件夹“**RobotPIDDriver_tb6612**”

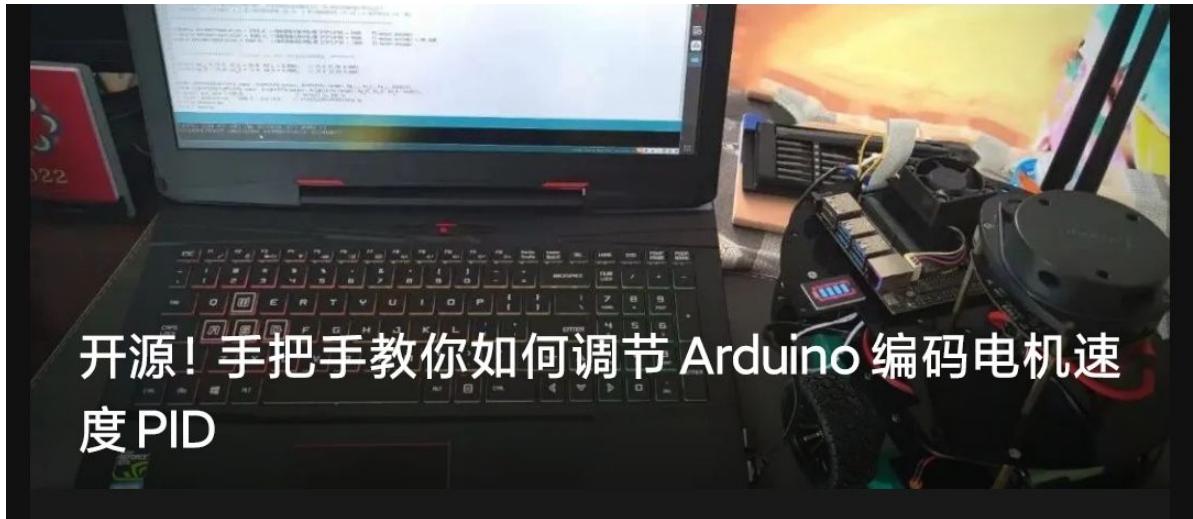
"RobotPIDDriver_A4950T"。配置过程参见如下的两篇微信公众号推文。

2022/1/1 17:09

开源！手把手教你驱动Arduino+ROS小车的电机



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3月11日

开源！手把手教你将超声波数据用 Rviz 可视化

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如果你使用的是Arduino 大功率电机及驱动器扩展板，那么烧录的程序就应该在该目录下：

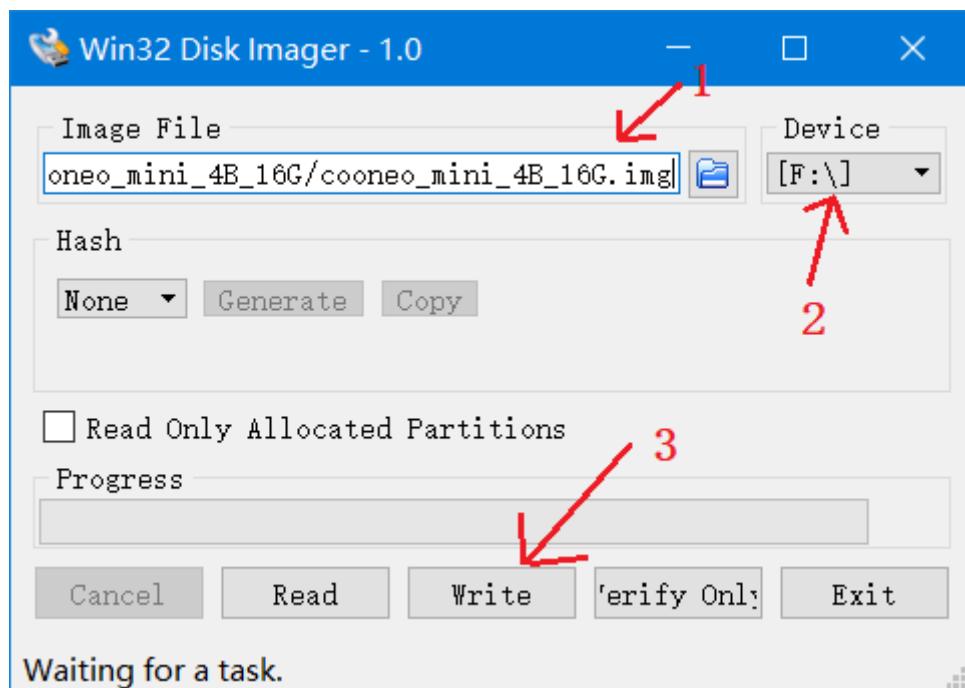
Arduino_mega_2560_code/Arduino_mega_2560大功率电机扩展板_code/Arduino-大功率电机驱动板_PID调速_ROS/RobotPIDDriver

具体的步骤，该文件夹中有图片提示，详细的过程，在我们的微信公众号“COONEO” 知乎“Neor” B站“COONEO” 中均有。

Step Two: FLASH OS and LAUNCH ROS NODE

1.flash Ubuntu OS into your Pi 4B board (By Win32DiskImager.exe)

The OS img can be finding in our **Wechat Official Account COONEO**. Process like this:



2. launch ROS node in Raspberry Pi

```
#connect Raspberry Pi and Arduino  
sudo chmod 0777 /dev/ttyACM0
```

```

#open a Terminal && download codes
git clone https://github.com/COONEO/Arduino_Raspberry_ROS_Car.git

# copy ROS node in your home folder
cp -r Arduino_Raspberry_ROS_car/Raspberry_Pi_ROS_Node/catkin_ws ~/

# change *.py file's permission
sudo chmod 0777
Arduino_Raspberry_ROS_car/Raspberry_Pi_ROS_Node/catkin_ws/src/ros_arduino_bridge/ros_ard
uino_python/src/ros_arduino_python/*
sudo chmod 0777
Arduino_Raspberry_ROS_car/Raspberry_Pi_ROS_Node/catkin_ws/src/ros_arduino_bridge/ros_ard
uino_python/nodes/arduino_node.py

cd catkin_ws
catkin_make
source devel/setup.bash
roslaunch ros_arduino_python arduino.launch

```

In the end, you can publish Topic "cmd_vel" msg to control ROS car running.



chapter 2: Gmapping with Arduino_Raspnerry_Car

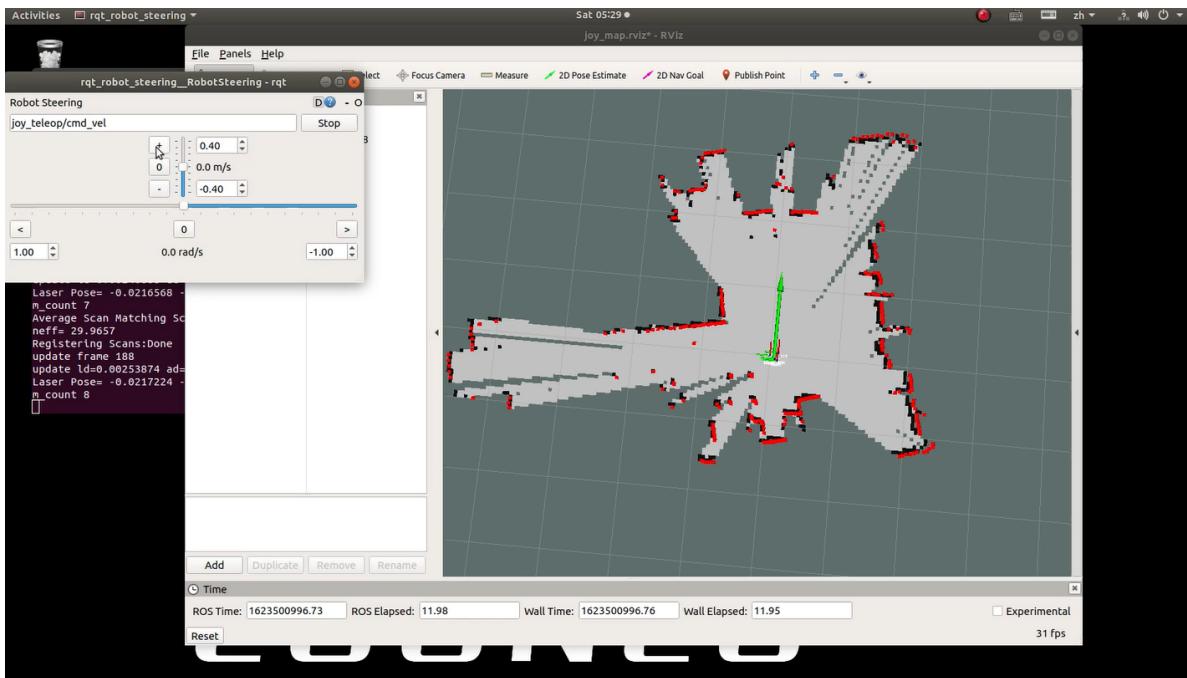
Step 1 : launch gmapping launch file and watching.

```

# open a Terminal
cd catkin_ws
source devel/setup.bash
roslaunch launch_file gmapping_ekf.launch

# open a Rviz && Visual a map
rosrun rviz rviz

```



Step 2 : save the map

```
# open a Terminal
# cd in your folder,P.S.
cd catkin_ws/src/launch_file/map/
rosrun map_server map_saver -f your_map_name
```

and then, the folder will create two files, they are **your_map_name.pgm** && **your_map_name.yaml** file.

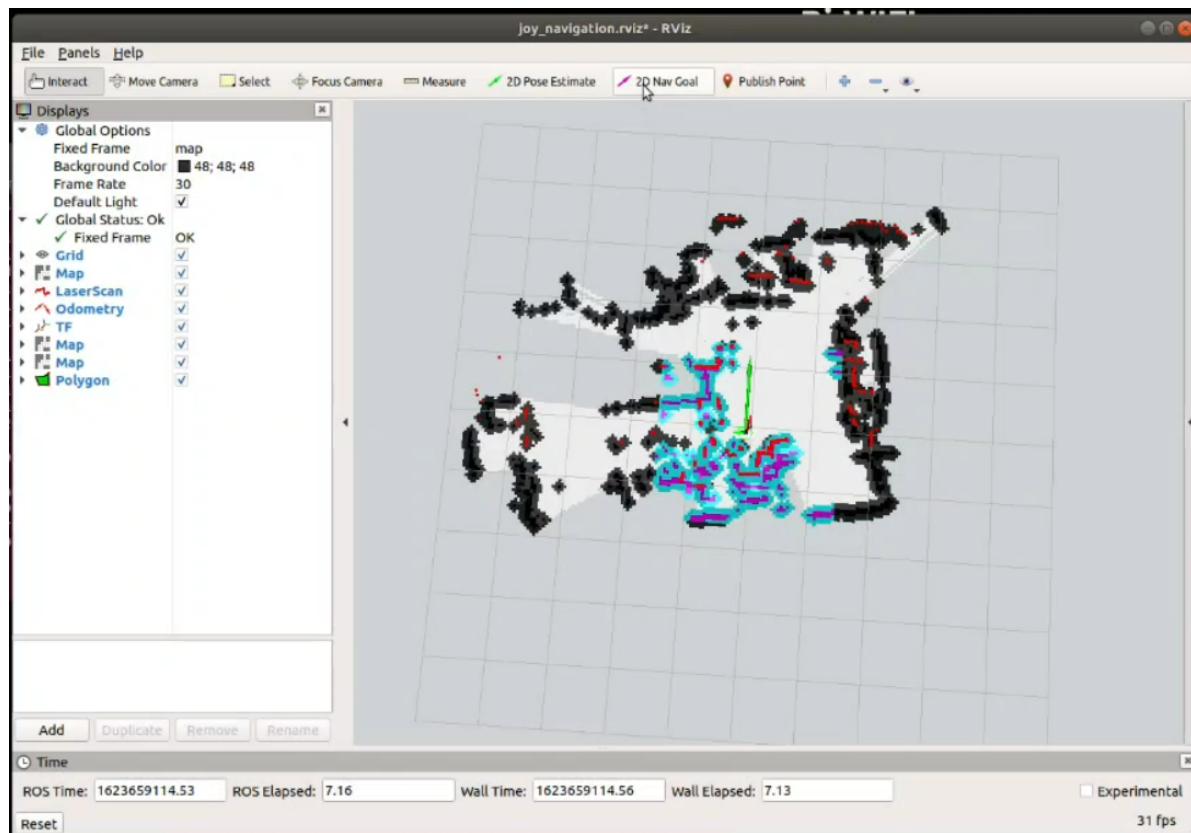
chapter 3 : Run ROS navigation stack

Step 1 : launch navigation_ekf.launch file.

```
# open a Terminal
cd catkin_ws
source devel/setup.bash
roslaunch launch_file navigation_ekf.launch

# and open another Terminal
rosrun rviz rviz
```

select topics like this in Rviz.

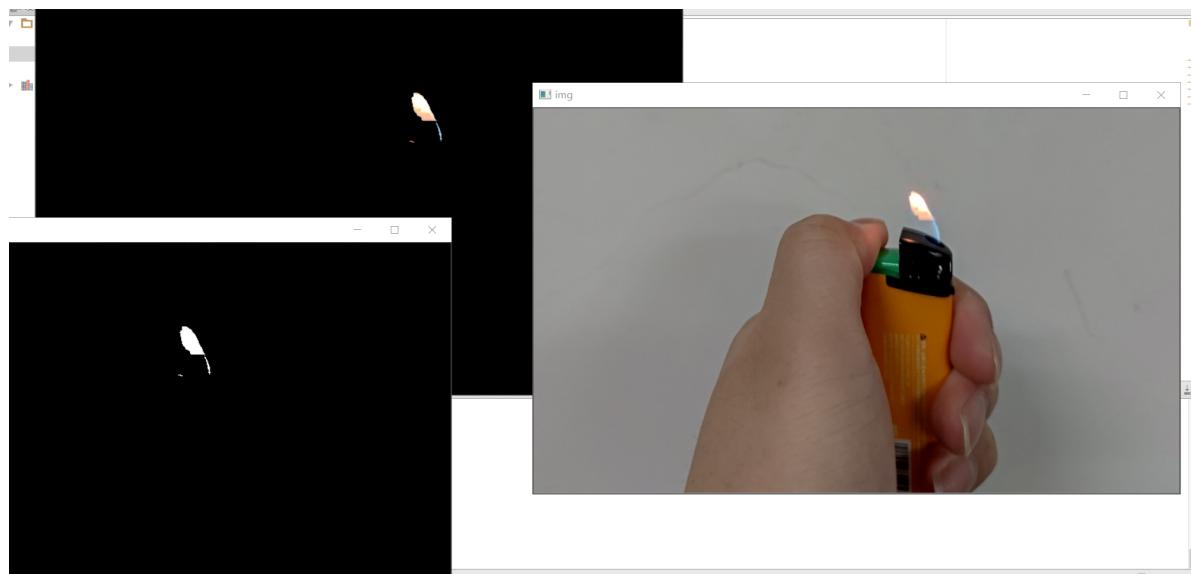


and then, click the "2D Nav Goal" button to select a Goal pose. for details, please see the "demo_videos/03_ROS_Navigation_function.mp4" file.

Chapter 4 : Fire detect

```
# open a Terminal
cd catkin_ws
source devel/setup.bash
fire_detect_cpp.launch #or "fire_detect.launch"

# and open another Terminal
rosrun rviz rviz
```



for more details,please see the "demo_videos/04_Fire_detect_based_on_color.mp4" file. or search the "COONEO" in your Bilibili.

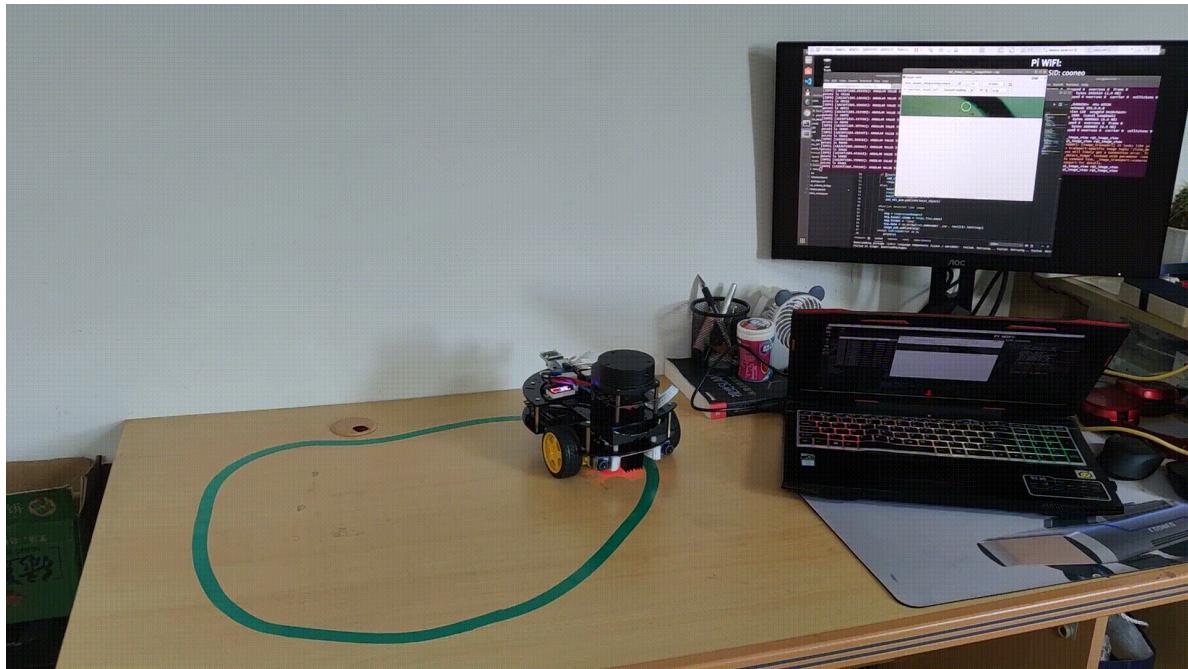
chapter 5 : automatic following the line

Step 1 : launch the ros_arduino_bridge node.

```
# open a terminal  
cd catkin_ws  
source devel/setup.bash  
  
roslaunch ros_arduino_python arduino.launch
```

Step 2 : launch the line_track launch file.

```
# open another terminal  
cd catkin_ws  
source devel/setup.bash  
roslaunch line_track linetrack_red.launch
```



2022.04.25

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For more details,you can search "COONEO" in your WeChat.



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