Installing the Rosmaster Driver Library

3.1. Pre-installation Notice

The factory image of the car already has the latest driver library installed, so you don't need to install it again. Installing the driver library is only necessary if you're using a different image or if the driver library has been updated.

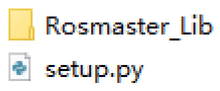
The factory driver library is stored in: ~/yahboomcar_ros2_ws/software/py_install_V3.3.9

Please refer to the following steps to install the driver library. This example uses version V3.3.9.

3.2. Downloading the Python Driver Library File

The latest version of the Rosmaster Python driver library is provided in this course material, named py_install.zip.

The compressed package contains the following files:


Rosmaster_Lib
setup.py

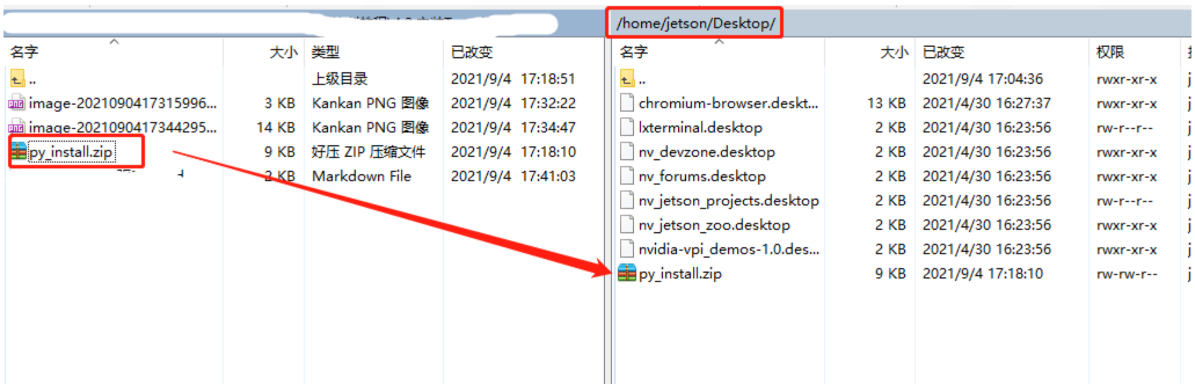
Or, in the Rosmaster download area on the Yahboom official website, click [Code] to download the latest version, py_install_V3.3.9.zip.

3.3. Transferring Files to Jetson Nano

If you are using the Jetson Nano's built-in browser to download files from the Yabo Intelligent official website, please download the files to a user-accessible location, such as the desktop.

If you are using the driver library compressed package file included in the documentation, or downloading the driver library file using a computer browser, you can use WinSCP to drag the compressed driver library file to the Jetson Nano desktop.

After successful installation, the driver library file can be deleted.



[redacted]

名字	大小	类型	已改变
..		上级目录	2021/9/4 17:18:51
image-2021090417315996...	3 KB	Kankan PNG 图像	2021/9/4 17:32:22
image-2021090417344295...	14 KB	Kankan PNG 图像	2021/9/4 17:34:47
py_install.zip	9 KB	好压 ZIP 压缩文件	2021/9/4 17:18:10
[redacted]	2 KB	Markdown File	2021/9/4 17:41:03

/home/jetson/Desktop/

名字	大小	已改变	权限	
..		2021/9/4 17:04:36	rwxr-xr-x	j
chromium-browser.deskt...	13 KB	2021/4/30 16:27:37	rwxr-xr-x	j
lxterminal.desktop	2 KB	2021/4/30 16:23:56	rw-r--r--	j
nv_devzone.desktop	2 KB	2021/4/30 16:23:56	rwxr-xr-x	j
nv_forums.desktop	2 KB	2021/4/30 16:23:56	rwxr-xr-x	j
nv_jetson_projects.desktop	2 KB	2021/4/30 16:23:56	rw-r--r--	j
nv_jetson_zoo.desktop	2 KB	2021/4/30 16:23:56	rwxr-xr-x	j
nvidia-vpi_demos-1.0.des...	2 KB	2021/4/30 16:23:56	rwxr-xr-x	j
py_install.zip	9 KB	2021/9/4 17:18:10	rw-rw-r--	j

3.4. Start the Installation

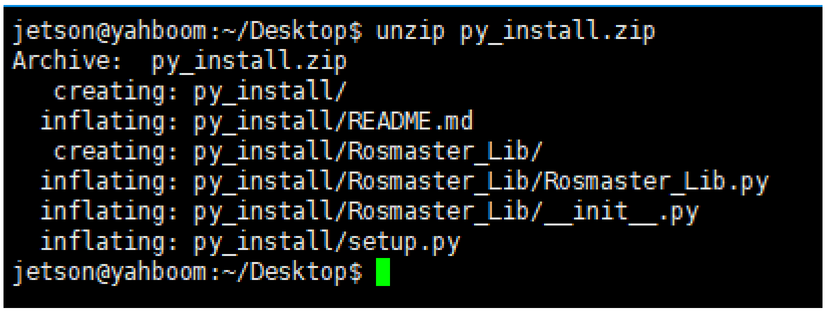
Open the Jetson Nano terminal and enter the following command to decompress the file.

Go to the desktop and check if the file exists. The target file is in the red box.

```
cd ~/Desktop && ls
```

Decompress the file

```
unzip py_install.zip
```



```
jetson@yahboom:~/Desktop$ unzip py_install.zip
Archive:  py_install.zip
   creating: py_install/
  inflating: py_install/README.md
   creating: py_install/Rosmaster_Lib/
  inflating: py_install/Rosmaster_Lib/Rosmaster_Lib.py
  inflating: py_install/Rosmaster_Lib/__init__.py
  inflating: py_install/setup.py
jetson@yahboom:~/Desktop$
```

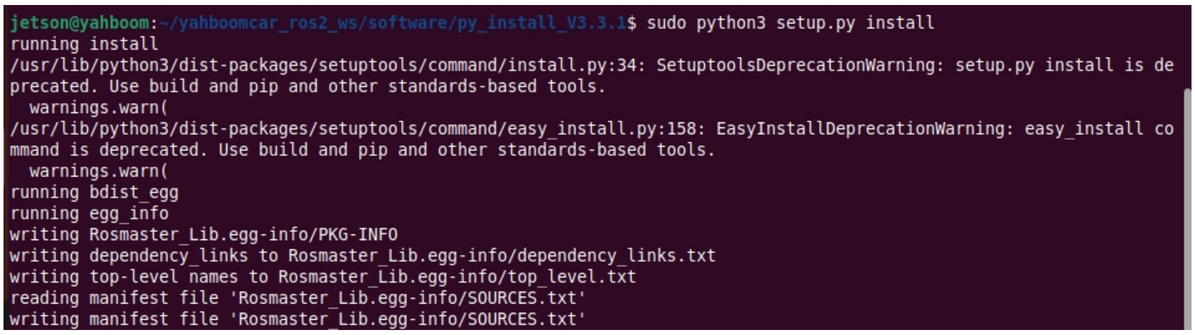
Note: The examples throughout this document assume that the py_install.zip compressed file is placed on the Jetson Nano system desktop. If you store the compressed file in a different directory, please navigate to the corresponding directory based on your actual location.

Enter the driver library folder.

```
cd py_install
```

Run the installation command. If you see the installed version number at the end, the installation is successful. This command will overwrite the previously installed Rosmaster_Lib driver library.

```
sudo python3 setup.py install
```



```
jetson@yahboom:~/yahboomcar_ros2_ws/software/py_install_V3.3.1$ sudo python3 setup.py install
running install
/usr/lib/python3/dist-packages/setuptools/command/install.py:34: SetuptoolsDeprecationWarning: setup.py install is de
precated. Use build and pip and other standards-based tools.
  warnings.warn(
/usr/lib/python3/dist-packages/setuptools/command/easy_install.py:158: EasyInstallDeprecationWarning: easy_install co
mmand is deprecated. Use build and pip and other standards-based tools.
  warnings.warn(
running bdist_egg
running egg_info
writing Rosmaster_Lib.egg-info/PKG-INFO
writing dependency_links to Rosmaster_Lib.egg-info/dependency_links.txt
writing top-level names to Rosmaster_Lib.egg-info/top_level.txt
reading manifest file 'Rosmaster_Lib.egg-info/SOURCES.txt'
writing manifest file 'Rosmaster_Lib.egg-info/SOURCES.txt'
```

3.5. Importing the Library File

The Rosmaster driver library is named Rosmaster_Lib. Use Rosmaster_Lib in your program to import the library.

```
from Rosmaster_Lib import Rosmaster
```

3.6 Basic Driver Library Usage

Source code path: Rosmaster/Samples/3.test_rosmaster.ipynb

3.7 API Introduction

The following is an introduction to the driver library API. Function usage and parameter contents will be explained in the control course later.

```
 |  __del__(self)
 |
 |  __init__(self, car_type=1, com='/dev/myserial', delay=0.002, debug=False)
 |      Initialize self.  See help(type(self)) for accurate signature.
 |
 |  clear_auto_report_data(self)
 |      # 清除单片机自动发送过来的缓存数据
 |      # Clear the cache data automatically sent by the MCU
 |
 |  create_receive_threading(self)
 |      # 开启接收和处理数据的线程
 |      # Start the thread that receives and processes data
 |
 |  get_accelerometer_data(self)
 |      # 获取加速度计三轴数据，返回a_x, a_y, a_z
 |      # Get accelerometer triaxial data, return a_x, a_y, a_z
 |
 |  get_battery_voltage(self)
 |      # 获取电池电压值
 |      # Get the battery voltage
 |
 |  get_gyroscope_data(self)
 |      # 获取陀螺仪三轴数据，返回g_x, g_y, g_z
 |      # Get the gyro triaxial data, return g_x, g_y, g_z
 |
 |  get_magnetometer_data(self)
 |      # 获取磁力计三轴数据，返回m_x, m_y, m_z
 |
 |  get_motion_data(self)
 |      # 获取小车速度，val_vx, val_vy, val_vz
 |      # Get the car speed, val_vx, val_vy, val_vz
 |
 |  get_motion_pid(self)
 |      # 获取小车的运动PID参数, 返回[kp, ki, kd]
 |      # Get the motion PID parameters of the dolly and return [kp, ki, kd]
 |
 |  get_motor_encoder(self)
 |      # 获取四路电机编码器数据
 |      # Obtain data of four-channel motor encoder
 |
 |  get_uart_servo_angle(self, s_id)
 |      # 读取总线舵机的角度，s_id表示要读取的舵机的ID号，s_id=[1-6]
 |      # Read the Angle of the bus steering gear, s_id indicates the ID number
of the steering gear to be
read, s_id=[1-6]
 |
 |  get_uart_servo_angle_array(self)
 |      # 一次性读取六个舵机的角度[xx, xx, xx, xx, xx, xx]，如果某个舵机错误则那一位为-1
 |      # Read the angles of three steering gear [xx, xx, xx, xx, xx, xx] at one
time. If one steering gear
 is wrong, that one is -1
 |
 |  get_uart_servo_value(self, servo_id)
 |      # 读取总线舵机位置参数, servo_id=[1-250], 返回：读到的ID，当前位置参数
 |      # Read bus servo position parameters, servo_id=[1-250], return: read ID,
current position parameter
s
 |
 |  get_version(self)
 |      # 获取底层单片机版本号，如1.1
 |      # Get the underlying microcontroller version number, such as 1.1
 |
 |  reset_flash_value(self)
 |      # 重置小车flash保存的数据，恢复出厂默认值。
 |      # Reset the car flash saved data, restore the factory default value
 |
 |  set_auto_report_state(self, enable, forever=False)
 |      # 单片机自动返回数据状态位，默认为开启，如果设置关闭会影响部分读取数据功能。
 |      # enable=True,底层扩展板会每隔10毫秒发送一包数据，总共四包不同数据，所以每包数据每40
毫秒刷新一次。e
nable=False，则不发送。
 |      # forever=True永久保存，=False临时作用。
 |      # The MCU automatically returns the data status bit, which is enabled by
default. If the switch is
closed, the data reading function will be affected.
 |      # enable=True, The underlying expansion board sends four different
packets of data every 10 millise
conds, so each packet is refreshed every 40 milliseconds.
 |      # If enable=False, the report is not sent.
 |      # forever=True for permanent, =False for temporary
 |
 |  set_beep(self, on_time)
 |      # 蜂鸣器开关，on_time=0：关闭，on_time=1：一直响，
 |      # on_time>=10：响xx毫秒后自动关闭（on_time是10的倍数）。
 |      # Buzzer switch. On_time =0: the buzzer is off. On_time =1: the buzzer
keeps ringing
 |      # On_time >=10: automatically closes after xx milliseconds (on_time is a
multiple of 10)
 |
 |  set_car_motion(self, v_x, v_y, v_z)
 |      # 小车运动控制,v_x=[-1.0, 1.0], v_y=[-1.0, 1.0], v_z=[-5.0, 5.0]
 |      # Car movement control, v_x = [-1.0, 1.0], v_y = [-1.0, 1.0], v_z =
[-5.0, 5.0]
 |
 |  set_car_run(self, state, speed, adjust=False)
 |      # 控制小车向前、向后、向左、向右等运动。
 |      # state=[0~6],=0停止,=1前进,=2后退,=3向左,=4向右,=5左旋,=6右旋
 |      # speed=[-100, 100], =0停止。
 |      # adjust=True开启陀螺仪辅助运动方向。=False则不开启。
 |      # Control the car forward, backward, left, right and other movements.
 |      # State =[0~6],=0 stop,=1 forward,=2 backward,=3 left,=4 right,=5 spin
left,=6 spin right
 |      # Speed =[-100, 100], =0 Stop.
 |      # Adjust =True Activate the gyroscope auxiliary motion direction.  If
=False, the function is disab
led.
 |
 |  set_car_type(self, car_type)
 |      # 设置小车类型
 |      # Set car Type
 |
 |  set_colorful_effect(self, effect, speed=255, parm=255)
 |      # RGB可编程灯带特效展示。
 |      # effect=[0, 6]，0：停止灯效，1：流水灯，2：跑马灯，3：呼吸灯，4：渐变灯，5：星光点
点，6：电量显示
 |      # speed=[1, 10]，数值越小速度变化越快。
 |      # parm，可不填，作为附加参数。用法1：呼吸灯效果传入[0, 6]可修改呼吸灯颜色。
 |      # RGB programmable light band special effects display.
 |      # Effect =[0, 6], 0: stop light effect, 1: running light, 2: running
horse light, 3: breathing ligh
t, 4: gradient light, 5: starlight, 6: power display
 |      # Speed =[1, 10], the smaller the value, the faster the speed changes
 |      # Parm, left blank, as an additional argument.  Usage 1: The color of
breathing lamp can be modifie
d by the effect of breathing lamp [0, 6]
 |
 |  set_colorful_lamps(self, led_id, red, green, blue)
 |      # RGB可编程灯带控制，可单独控制或全体控制，控制前需要先停止RGB灯特效。
 |      # led_id=[0, 13]，控制对应编号的RGB灯；led_id=0xFF, 控制所有灯。
 |      # red,green,blue=[0, 255]，表示颜色RGB值。
 |      # RGB programmable light belt control, can be controlled individually or
collectively, before contr
ol need to stop THE RGB light effect.
 |      # Led_id =[0, 13], control the CORRESPONDING numbered RGB lights;
Led_id =0xFF, controls all light
s.
 |      # Red,green,blue=[0, 255], indicating the RGB value of the color.
 |
 |  set_motor(self, speed_1, speed_2, speed_3, speed_4)
 |      # 控制电机PWM脉冲，从而控制速度（未使用编码器测速）。speed_X=[-100, 100]
 |      # Control PWM pulse of motor to control speed (speed measurement without
encoder). speed_X=[-100, 1
00]
 |
 |  set_pid_param(self, kp, ki, kd, forever=False)
 |      # PID 参数控制，会影响set_car_motion函数控制小车的运动速度变化情况。默认情况下可不
调整。
 |      # kp ki kd = [0, 10.00], 可输入小数。
 |      # forever=True永久保存，=False临时作用。
 |      # 由于永久保存需要写入芯片flash中，操作时间较长，所以加入delay延迟时间，避免导致单片
机丢包的问题。
 |      # 临时作用反应快，单次有效，重启单片后数据不再保持。
 |      # PID parameter control will affect the set_CAR_motion function to
control the speed change of the
car.  This parameter is optional by default.
 |      # KP ki kd = [0, 10.00]
 |      # forever=True for permanent, =False for temporary.
 |      # Since permanent storage needs to be written into the chip flash, which
takes a long time to opera
te, delay is added to avoid packet loss caused by MCU.
 |      # Temporary effect fast response, single effective, data will not be
maintained after restarting th
e single chip
 |
 |  set_pwm_servo(self, servo_id, angle)
 |      # 舵机控制，servo_id：对应ID编号，angle：对应舵机角度值
 |      # servo_id=[1, 4], angle=[0, 180]
 |      # Servo control, servo_id: corresponding, Angle: corresponding servo
Angle value
 |
 |  set_pwm_servo_all(self, angle_s1, angle_s2, angle_s3, angle_s4)
 |      # 同时控制四路PWM的角度，angle_sX=[0, 180]
 |      # At the same time control four PWM Angle, angle_sX=[0, 180]
 |
 |  set_uart_servo(self, servo_id, pulse_value, run_time=500)
 |      # 控制总线舵机。servo_id:[1-255],表示要控制的舵机的ID号, id=254时, 控制所有已连接
舵机。
 |      # pulse_value=[96,4000]表示舵机要运行到的位置。
 |      # run_time表示运行的时间(ms),时间越短,舵机转动越快。最小为0，最大为2000
 |      # Control bus steering gear.  Servo_id :[1-255], indicating the ID of
the steering gear to be contr
olled. If ID =254, control all connected steering gear.
 |      # pulse_value=[96,4000] indicates the position to which the steering
gear will run.
 |      # run_time indicates the running time (ms). The shorter the time, the
faster the steering gear rota
tes.  The minimum value is 0 and the maximum value is 2000
 |
 |  set_uart_servo_angle(self, s_id, s_angle, run_time=500)
 |      # 设置总线舵机角度接口：id:7-9, angle: 7:[0, 225], 8:[30, 270], 9:[30, 180],
设置舵机要运动到的角度
。
 |      # 设直立向上夹紧状态，三个舵机都为180度，7/8号顺时针（向下）转为减，逆时针（向上）转为
增，夹子松开
为减，夹紧为增。
 |      # run_time表示运行的时间(ms),时间越短,舵机转动越快。最小为0，最大为2000
 |      # Set bus steering gear Angle interface: ID :7-9, Angle :7 :[0, 225], 8:
[30, 270], 9:[30, 180], set
 steering gear to move to the Angle.
 |      # Set up the vertical clamping state, the three steering gear are 180
degrees, 7/8 clockwise (down)
 to decrease, counterclockwise (up) to increase, clip release to decrease,
clamping to increase.
 |      # run_time indicates the running time (ms). The shorter the time, the
faster the steering gear rota
tes.  The minimum value is 0 and the maximum value is 2000
 |
 |  set_uart_servo_angle_array(self, angle_s=[90, 90, 90, 90, 90, 180],
run_time=500)
 |      # 同时控制机械臂所有舵机的角度。
 |      # Meanwhile, the Angle of all steering gear of the manipulator is
controlled
 |
 |  set_uart_servo_id(self, servo_id)
 |      # 设置总线舵机的ID号，servo_id=[1-250]。
 |      # 运行此函数前请确认只连接一个总线舵机，否则会把所有已连接的总线舵机都设置成同一个ID，
造成控制混乱
。
 |      # Set the bus servo ID, servo_id=[1-250].
 |      # Before running this function, please confirm that only one bus
actuator is connected. Otherwise,
all connected bus actuators will be set to the same ID, resulting in confusion
of control
 |
 |  set_uart_servo_offset(self, servo_id)
 |      # 设置机械臂的中位偏差，servo_id=0~6， =0全部恢复出厂默认值
 |      # Run the following command to set the mid-bit deviation of the
manipulator: servo_id=0 to 6, =0 Re
store the factory default values
 |
 |  set_uart_servo_torque(self, enable)
 |      # 关闭/打开总线舵机扭矩力, enable=[0, 1]。
 |      # enable=0:关闭舵机扭矩力，可以用手转动舵机，但命令无法控制转动；
 |      # enable=1：打开扭矩力，命令可以控制转动，不可以用手转动舵机。
 |      # Turn off/on the bus steering gear torque force, enable=[0, 1].
 |      # enable=0: Turn off the torque force of the steering gear, the steering
gear can be turned by hand
, but the command cannot control the rotation;
 |      # enable=1: Turn on torque force, command can control rotation, can not
turn steering gear by hand
```