

## Lesson 24 Remote Control - Introduction to GUI

### 24.1 Overview

In this lesson, we will introduce the method of controlling the robot through a desktop GUI program written in Python. However, it is not recommended for beginners, as it requires some additional knowledge and experience.

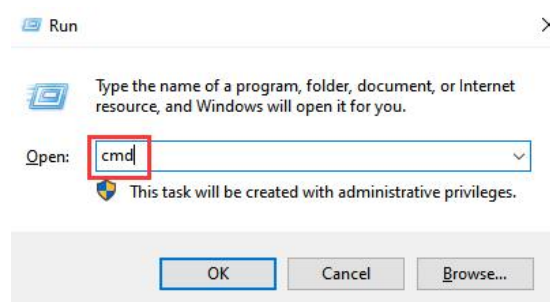
### 24.2 Installing GUI Dependent Libraries on Windows

#### Installing Python3

- You need to install Python on your computer to run the program for PC. Since the code of this robot was developed and debugged by Python3, please download the Python3.7 version or higher in case of any error caused by incompatibility.
- Download Python3 at this link: <https://www.python.org/downloads/windows/>
- Double click the installation package to install Python.
- Pay attention to select **Add Python to PATH** when installing.

#### Install the required dependency libraries.

- Press **Win + R** key, type in "**cmd**", and click **OK** to start cmd.



#### Installing NumPy

- NumPy is a basic software package for scientific calculation through Python. OpenCV needs to use some of its functions.
- Type in the command below to install NumPy:

```
pip3 install numpy
```

```
r-Pro\Client>pip3 install numpy
Requirement already satisfied: numpy in d:\python\lib\site-packages (1.24.4)
WARNING: You are using pip version 20.2.3; however, version 25.0.1 is available.
You should consider upgrading via the 'd:\python\python.exe -m pip install --up
grade pip' command.
```

## Installing OpenCV

```
pip3 install opencv-contrib-python
```

```
r-Pro\Client>pip3 install opencv-contrib-python
Requirement already satisfied: opencv-contrib-python in d:\python\lib\site-packa
ges (4.10.0.84)
Requirement already satisfied: numpy>=1.17.0; python_version >= "3.7" in d:\pyth
on\lib\site-packages (from opencv-contrib-python) (1.24.4)
WARNING: You are using pip version 20.2.3; however, version 25.0.1 is available.
You should consider upgrading via the 'd:\python\python.exe -m pip install --upg
rade pip' command.
```

## Installing zmq and pybase64

- zmq and pybase64 are the libraries for real time video

```
pip3 install zmq pybase64
```

```
r-Pro\Client>pip3 install zmq pybase64
Requirement already satisfied: zmq in d:\python\lib\site-packages (0.0.0)
Requirement already satisfied: pybase64 in d:\python\lib\site-packages (1.4.0)
Requirement already satisfied: pyzmq in d:\python\lib\site-packages (from zmq) (
26.2.0)
WARNING: You are using pip version 20.2.3; however, version 25.0.1 is available.
You should consider upgrading via the 'd:\python\python.exe -m pip install --upg
rade pip' command.
```

## GUI Client Program

The **GUI.py** is included in the code file of the robot

 Client	2025/4/18 14:59
 examples	2025/3/10 16:48
 web	2025/4/18 14:59
 initPosServos.py	2025/3/10 15:25
 README.md	2025/2/10 18:13
 setup.py	2025/2/10 16:45

 Footage-GUI.py	2025/3/22 12:02
 <b>GUI.py</b>	2025/4/18 14:51
 logo.png	2019/4/27 18:07

You can also download this code from GitHub:

[https://github.com/adeept/Adeept\\_RaspTank\\_Metal](https://github.com/adeept/Adeept_RaspTank_Metal)

## 24.3 Introducing GUI Control Program

Control the robot via GUI, you need to manually run **GUIServer.py** on Raspberry Pi. (similar to manually running **webServer.py**, the only difference is the **GUIServer.py** program)

1. Terminate the auto-run program of **webServer.py** on Raspberry Pi:

```
sudo killall python3
```

```
pi@raspberrypi:~ $ sudo killall python3
```

2. Run the **GUIServer.py** program:

```
sudo python3 Adeept_RaspTank_Metal/web/GUIServer.py
```

```
pi@raspberrypi:~ $ sudo python3 Adeept_RaspTank_Metal/web/GUIServer.py
/usr/lib/python3/dist-packages/gpiozero/input_devices.py:852: PWMSoftwareFallback: For more accurate readings, use the pigpio pin factory. See https://gpiozero.readthedocs.io/en/stable/api_input.html#distancesensor-hc-sr04 for more info
  warnings.warn(PWMSoftwareFallback(
/usr/lib/python3/dist-packages/gpiozero/input_devices.py:975: DistanceSensorNoEcho: no echo received
  warnings.warn(DistanceSensorNoEcho('no echo received'))
/usr/lib/python3/dist-packages/gpiozero/input_devices.py:975: DistanceSensorNoEcho: no echo received
  warnings.warn(DistanceSensorNoEcho('no echo received'))
.....pause.....
.....pause.....
.....pause.....
192.168.3.31
Waiting for client connection
```

After **GUIServer.py** run successfully on Raspberry, run **GUI.py** on Windows.

3. Run **GUI.py** in cmd. If you right click on the **GUI.py** file in the folder, there may be an error message.

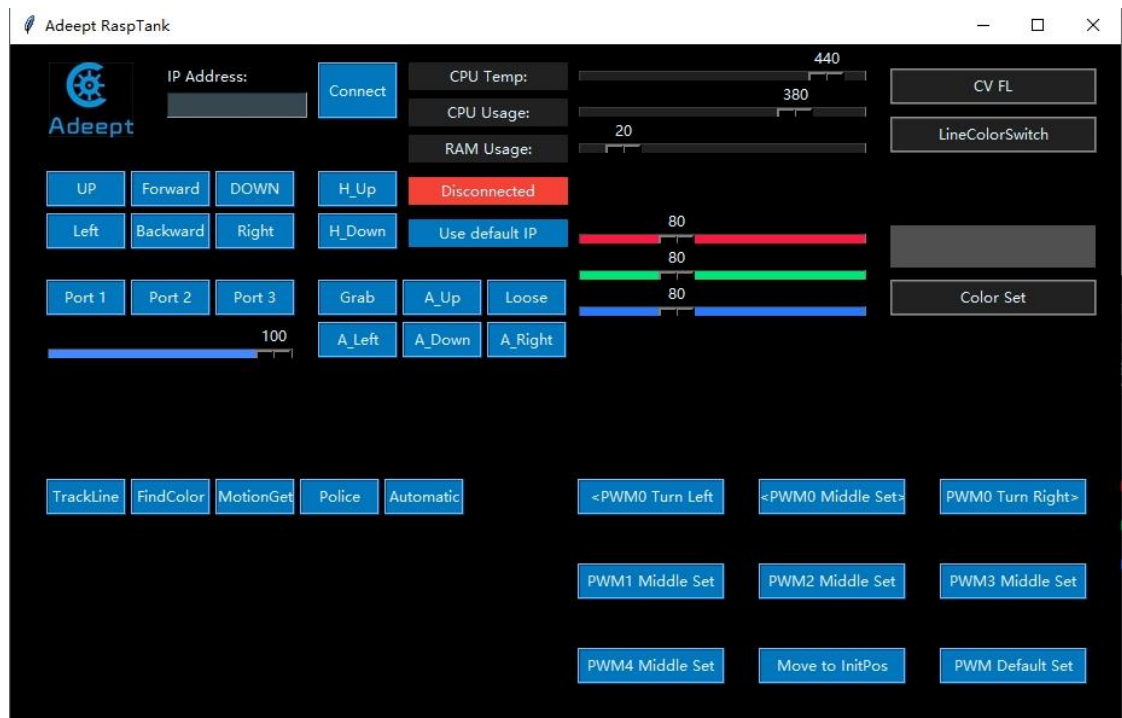
Access the folder of the robot program:

```
H:\>cd Robot\Adeept_RaspTank_Metal\Client
H:\Robot\Adeept_RaspTank_Metal\Client>.
```

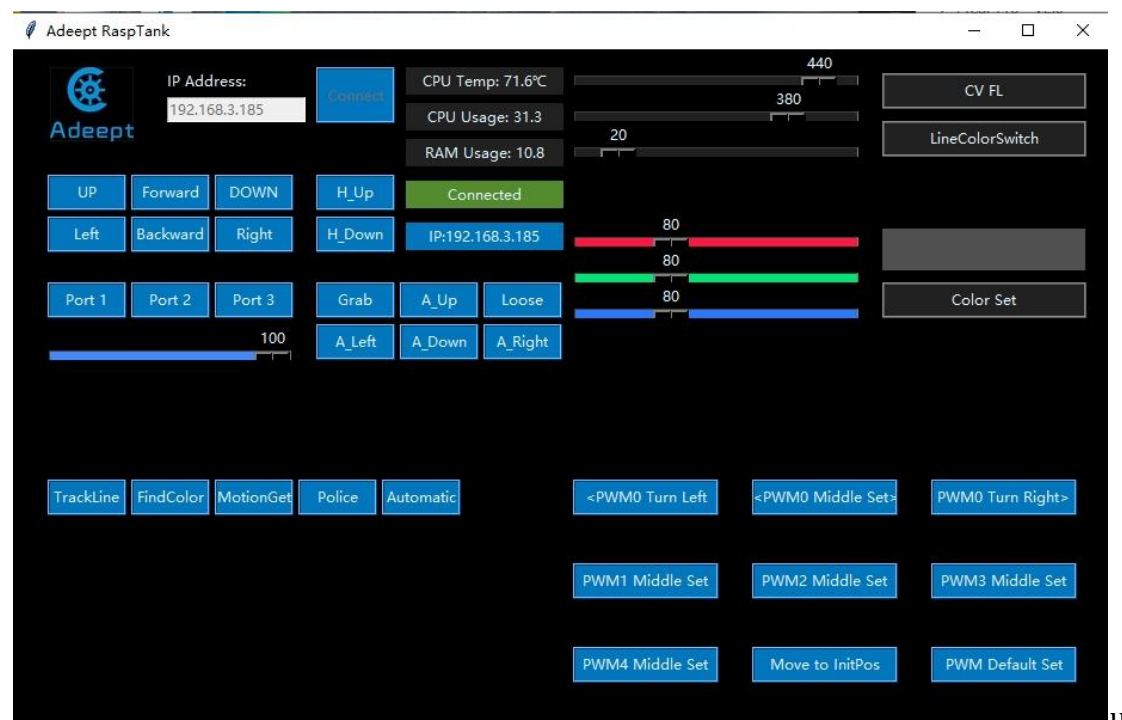
Run the **GUI.py** program (run it after accessing the "Client" folder, or there may be an error).

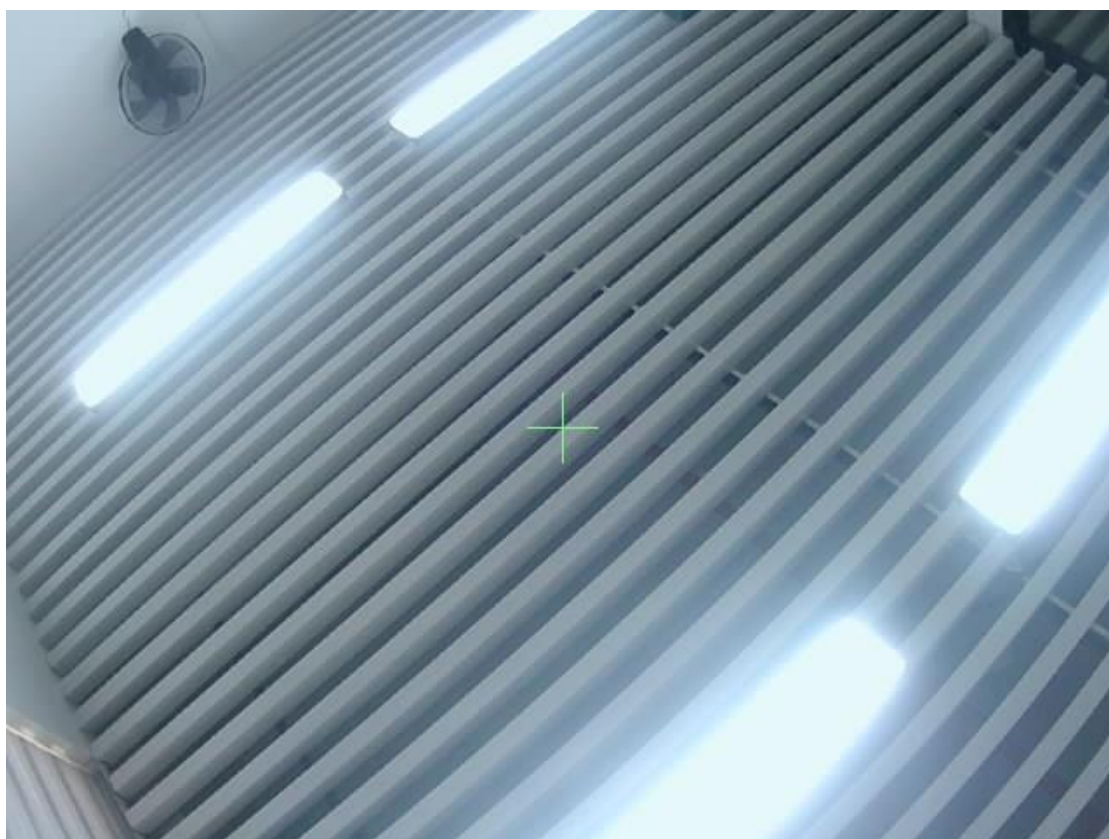
```
python GUI.py
```

The GUI interface will appear after run successfully.



- Enter the IP address of the Raspberry Pi in the GUI on PC, click **Connect**, and you can control the robot now. For instance, enter **192.168.3.185**





The operation instructions are as follows:

Button	Instruction	Describe
Forward/The <b>W</b> key on the keyboard	forward/DS	Car moving forward
Backward/The <b>S</b> key on the keyboard	backward/DS	Car backwards
Left/The <b>A</b> key on the keyboard	left/TS	Turn left in the car
Right/The <b>D</b> key on the keyboard	right/TS	Turn right in the car
speed	wsB X	Adjusting speed
UP/The <b>I</b> key on the keyboard	up/UDstop	Control the camera to move upwards
DOWN/The <b>K</b> key on the keyboard	down/UDstop	Control the camera to move downwards

Grab/The <b>U</b> key on the keyboard	grab/GLstop	Claw open
A_Up/The <b>R</b> key on the keyboard	armUp/armStop	The robotic arm moves upwards
Loose/The <b>O</b> key on the keyboard	loose/GLstop	Claw closedl
H_Up/The <b>P</b> key on the keyboardu	handUp/handStop	The robotic hand moves upwards
A_Left/The <b>J</b> key on the keyboard	lookleft/LRstop	Claw left turn
A_Down/The <b>F</b> key on the keyboard	armDown/armStop	The robotic arm moves downwards
A_Right/The <b>L</b> key on the keyboard	lookright/LRstop	Claw to the right
H_Down/The <b>;</b> key on the keyboard	handDown/handStop	The robotic hand moves downwards
CV FL	CVFL/stopCV	Switch video tracking line function
LineColorSwitch	CVFLColorSet 0/CVFLColorSet 255	Switch to search for white lines on black or black lines on white.
L1	CVFLL1 X	Set the height of L1 auxiliary line
L2	CVFLL2 X	Set the height of L2 auxiliary line
<PWM0 Turn Left	SiLeft 0	Click the button to control the 0 channel servo to rotate clockwise.
PWM0 Turn Right>	SiRight 0	Click the button to control the 0 channel servo to rotate counterclockwise
<PWM0 Middle set>	PWMMS 0	Click the button to control the 0 channel servo to 90 degrees



<PWM1 Middle set>	PWMMS 1	Click the button to control the 1 channel servo to 90 degrees
<PWM2 Middle set>	PWMMS 2	Click the button to control the 2 channel servo to 90 degrees
<PWM3 Middle set>	PWMMS 3	Click the button to control the 3 channel servo to 90 degrees
<PWM4 Middle set>	PWMMS 4	Click the button to control the 4 channel servo to 90 degrees
Move to InitPos	PWMINIT	Move the servo to its initial position
PWM Default Set	PWMD	Set the PWM of the servo to the default setting
CPU Temp		Shows the temperature of the Raspberry Pi CPU
CPU Usage		Shows the usage of the Raspberry Pi CPU
RAM Usage		Shows the usage of the Raspberry Pi memory
MotionGet	motionGet/stopCV	Switch to monitor mode, the robot stops moving and reacts to the moving objects detected by the camera, which are framed in the video module.
Automatic	automatic/automaticOff	Switch to automatic obstacle avoidance mode

Police	police/policeOff	Make the WS2812 LED lights on the robot flash alternately in red and blue.
TrackLine	trackLine/trackLineOff	Implement line tracking function using a 3-channel infrared module.
FindColor	findColor/stopCV	Turn on/off the color detection function.
Color Set	{'title': 'findColorSet', 'data': [r,g,b]}	Select the color to be detected
Port 1	Switch_1_on/Switch_2_off	Control the LED1 light to turn on and off
Port 2	Switch_2_on/Switch_2_off	Control the LED2 light to turn on and off
Port 3	Switch_3_on/Switch_3_off	Control the LED3 light to turn on and off