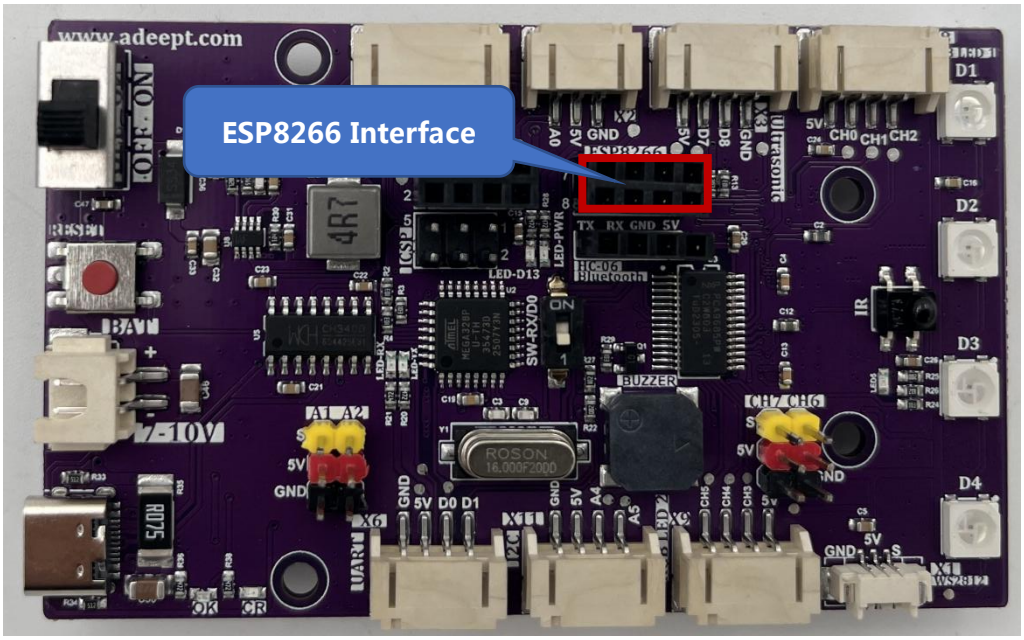
Lesson 22 Remote Control- Introduction to GUI

22.1 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.

22.2 Install of ESP8266 Module



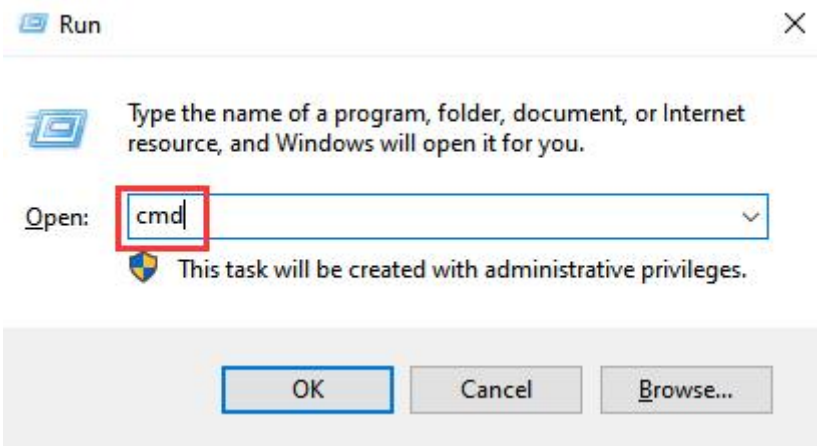
22.3 Configure the Usage Environment on the PC

- 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.

Installing pySerial

- **pySerial** encapsulates the serial communication module, supporting Linux, Windows, BSD (may support all operating systems that support POSIX), Python (Java) and IconPython (.NET and Mono). The **pySerial** module encapsulates access to the serial port.
- Press Win + R key, type in "**cmd**", and click OK to start **cmd**. (MAC users do it in the terminal.)



- Type in the command below to install **pySerial**:

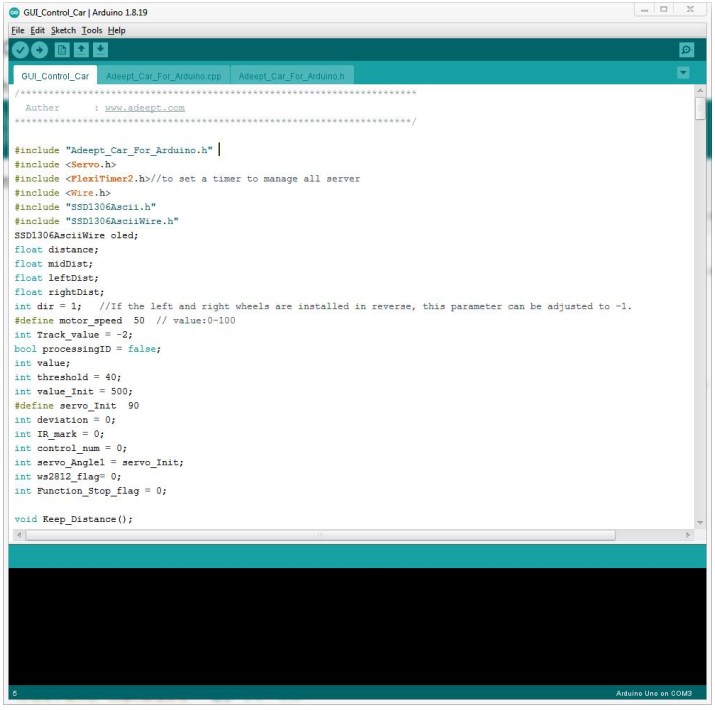
```
pip install pySerial
```

```
C:\ pip install pySerial
Looking in indexes: https://pypi.tuna.tsinghua.edu.cn/simple/
Collecting pySerial
  Using cached https://pypi.tuna.tsinghua.edu.cn/packages/07/bc/587a445451b253b285629263eb51c2d8e9bcea4fc97826266d186f96f558/pyserial-3.5-py2.py3-none-any.whl (90 kB)
Installing collected packages: pySerial
Successfully installed pySerial-3.5

[notice] A new release of pip is available: 25.0.1 -> 25.1.1
[notice] To update, run: python.exe -m pip install --upgrade pip
```

22.4 Upload the Program to the Arduino Car

1. Connect your computer and Adeept Robot Control Board (Arduino Board) with a USB cable.

2. Open "**13_Remote_Control_Mecanum\GUI_Control\GUI_Control_Car**" folder in "\Code", double-click "GUI_Control_Car.ino".

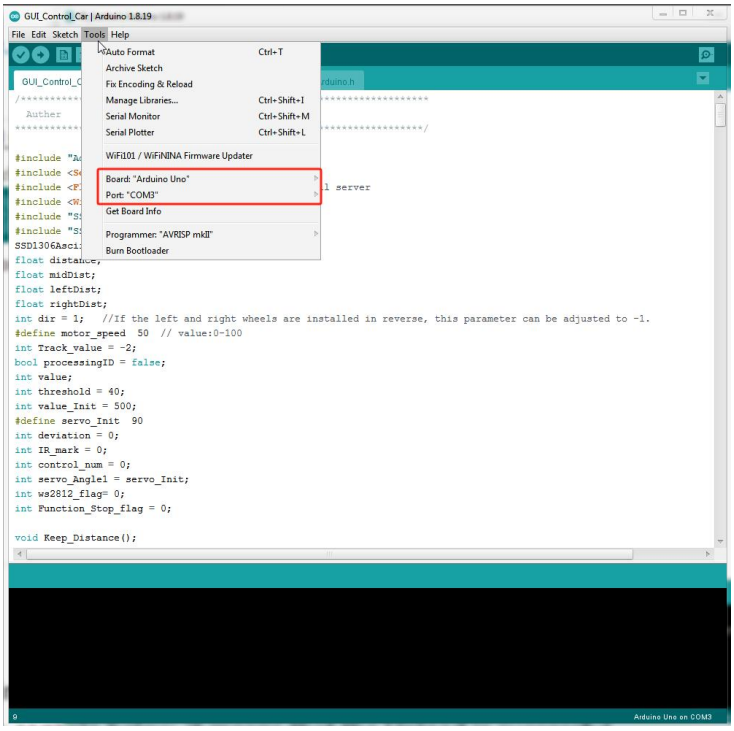


3. Select development board and serial port.

Board: Tools--->Board--->Arduino AVR Boards--->Arduino Uno

Port: Tools --->Port--->COMx

Note: The port number will be different in different computers.

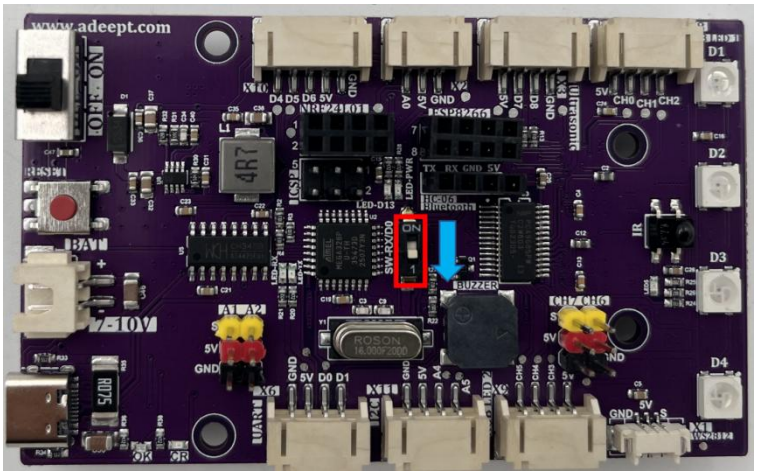


4. After opening, click  to upload the code program to the Arduino. If there is no error warning in the console below, it means that the Upload is successful.

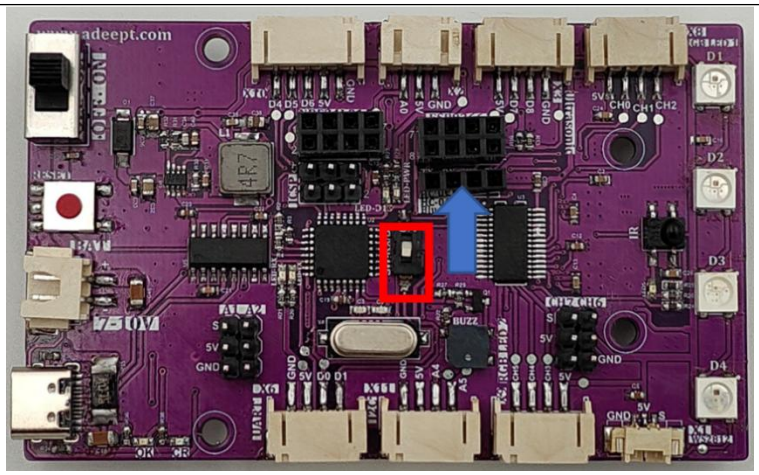
```
Done uploading.

Sketch uses 19710 bytes (61%) of program storage space. Maximum is 32256 bytes.
Global variables use 1223 bytes (59%) of dynamic memory, leaving 825 bytes for local variables. Maximum is 2048 bytes.
```

Note: When the ESP8266 module transmits data to the Arduino, it needs to occupy the RX interface of the Arduino, and when the Arduino uploads the program, it also needs to occupy the RX interface. The RX interface cannot satisfy both functions at the same time, so a switch is needed to distinguish them.

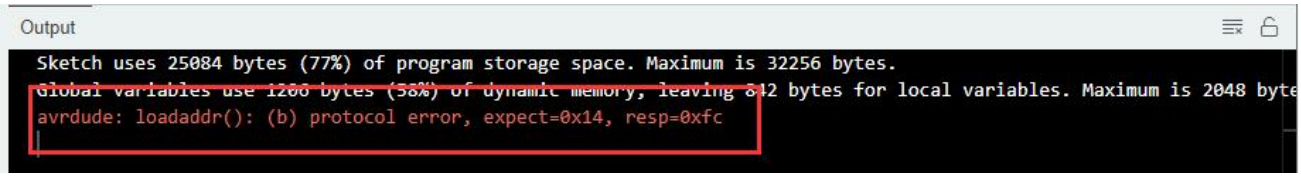
When the switch is flipped downward, the ESP8266 module is disconnected from the RX interface, and the program can be uploaded normally.

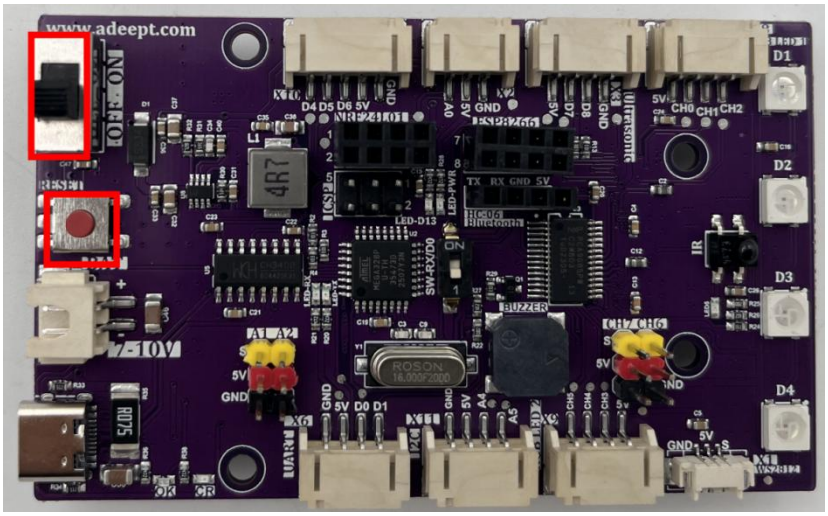


When the switch is flipped upward, the RX interface is connected to the ESP8266, and the ESP8266 module will continue to occupy the RX interface. At this time, the program cannot be uploaded normally.

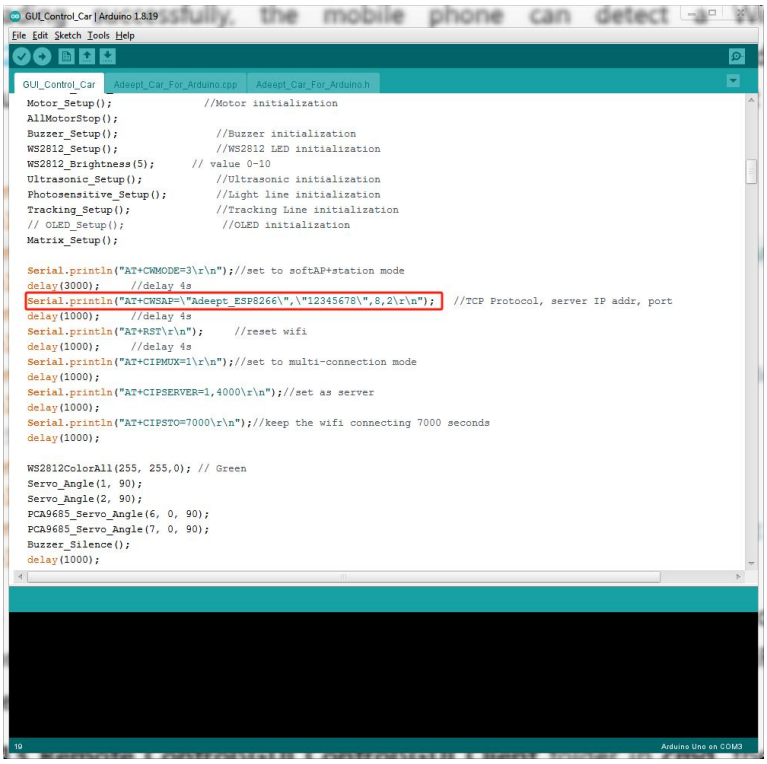


If the following error messages also appear, this may cause the program upload to fail. Please try to press the "RESET" button, or try to turn off the power switch and then turn on the power switch.





5. After uploading successfully, the mobile phone can detect a WiFi name named "Adeept_ESP8266", and the WiFi password is "12345678". The WiFi name and password can be modified through the procedure below. Modifications to the program are not recommended for initial use.



6. Use PC to connect to "Adeept_ESP8266" WiFi. Since this WiFi can only be used for communication between the PC and ESP8266, after the PC is connected to WiFi, it cannot access the external network (you cannot use the PC to access the Internet).

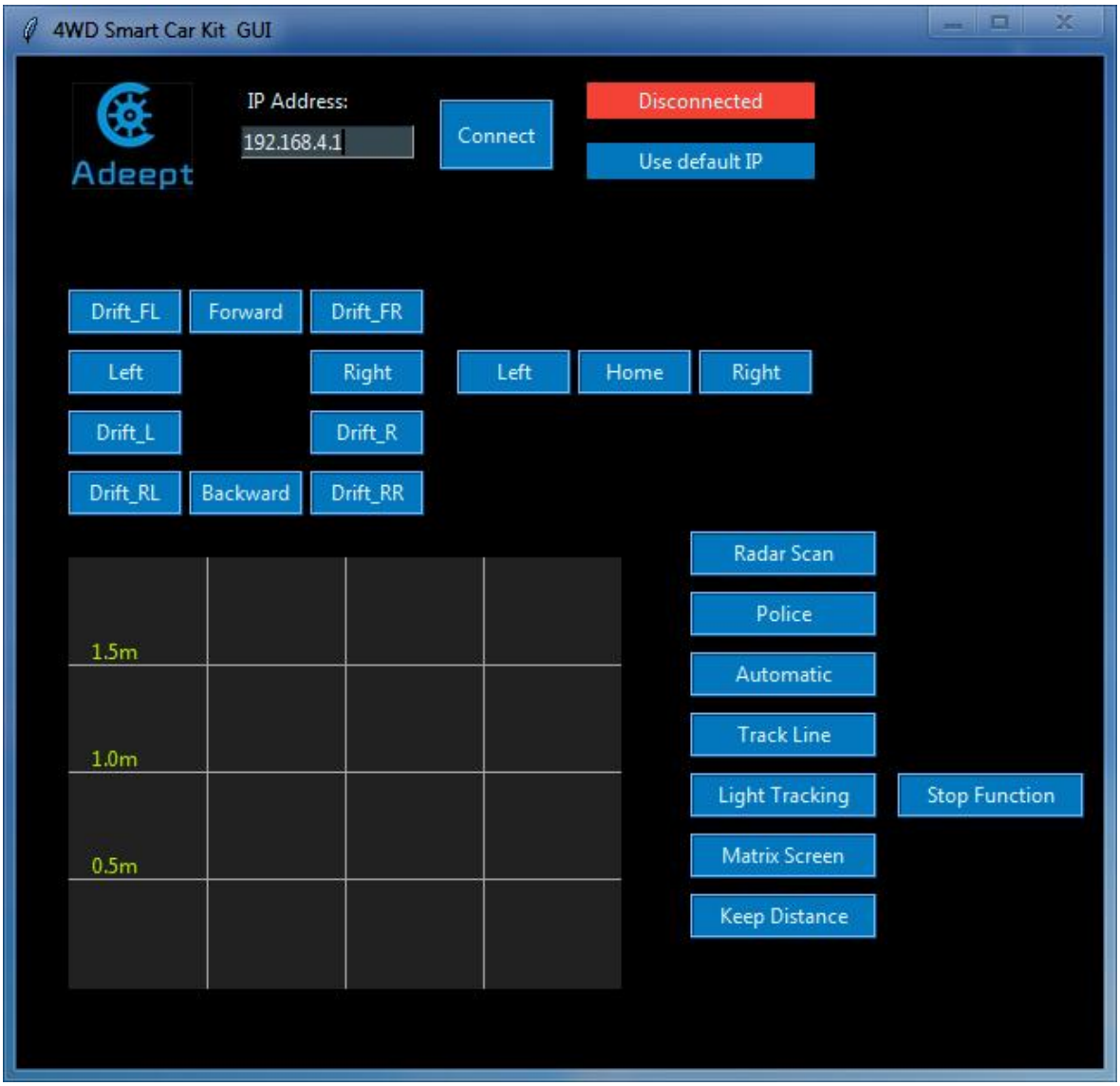
7. Enter the **\13_Remote_Control_Mecanum\GUI_Control\GUI_Client** folder in **cmd**, then run the **GUI.py** program in CMD.


```
python GUI.py
```

```
E:\adeept\ADA038\Adeept_4WD_Smart_Car_Kit_for_Arduino\Code\13_Remote_Control_Mec
anum\GUI_Control\GUI_Client>python GUI.py
```

Enter the IP address, then click "**Connect**".

IP Address: 192.168.4.1



The operation instructions are as follows:

Button	Instruction	Describe
Forward/The **W** key on the keyboard	forward/DS	Car moving forward
Backward/The **S** key on the keyboard	backward/DS	Car backwards
Left/The **A** key on the	turn_left/TS	Turn left in the car

keyboard		
Right/The **D** key on the keyboard	turn_right/TS	Turn right in the car
Drift_FL/The **Z** key on the keyboard	drift_front_left/DRS	The car drifts to the left front.
Drift_FR/The **X** key on the keyboard	drift_front_right/DRS	The car drifts to the right front.
Drift_L/The **C** key on the keyboard	drift_left/DRS	The car drifts to the left.
Drift_R/The **V** key on the keyboard	drift_right/DRS	The car drifts to the right.
Drift_RL/The **B** key on the keyboard	drift_rear_left/DRS	The car drifts to the left rear.
Drift_RR/The **N** key on the keyboard	drift_rear_right/DRS	The car drifts to the right rear.
Left/The **J** key on the keyboard	lookleft/LRstop	Head left turn
Right/The **L** key on the keyboard	lookright/LRstop	Head to the right
Home	home	Head back to the middle position
Radar Scan	scan	Used to perform the ultrasound scan function and display the scan results
Automatic	automatic	Switch to automatic obstacle avoidance mode

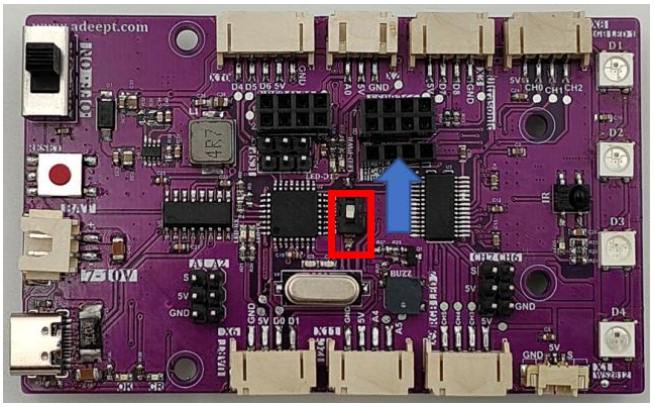
Police	police	Make the WS2812 LED lights on the robot flash alternately in red and blue.
Track Line	trackLine	Implement line tracking function using a 3-channel infrared module.
Light Tracking	lightTracking	Light Tracking Function
Matrix Screen	matrix	Matrix screen lights up
Keep Distance	KD	Keep distance
Stop Function	StopFunction	Stop Function

Q&A

If the GUI cannot be opened or operated:

1. Please check whether you are connected to the WiFi named "**Adeept_ESP8266**".

2. Check whether the RX/D0 switch is correctly turned on.



If the rotation direction of the wheels is opposite to the actual operation, please perform the following steps:

Go to the '**Code\13_Remote_Control_Mecanum\GUI_Control\GUI_Control_Car**' folder, open the '**GUI_Control_Car.ino**' file, and modify the parameter '**dir=-1**'.