





Lesson 18 Introduction to NRF Module

18.1 Components used in this course

Components	Quantity	Picture
Adeept Robot Control Board	1	
Micro USB Cable	1	
Handle controller	1	
NRF Module	1	

18.2 Introduction to NRF Module

The NRF24L01 is a 2.4GHz wireless communication module developed by Nordic Semiconductor. It's widely used in Internet of Things (IoT) and wireless communication applications to achieve low-power, short-range wireless data transmission. The NRF24L01 module finds applications in wireless sensor networks, remote controls, smart homes, and more.

Key Features:

2.4GHz Frequency: The NRF24L01 operates in the 2.4GHz frequency range, providing reliable wireless connectivity without interfering with common Wi-Fi and Bluetooth signals.

Low Power Consumption: It consumes extremely low power during transmission and reception, making it suitable for long-lasting low-power applications.

Multi-Channel Support: The module supports multiple channels to reduce interference and enhance signal stability.

Data Rates: It supports various data rates, allowing selection based on application needs, ranging from 250kbps to 2Mbps.

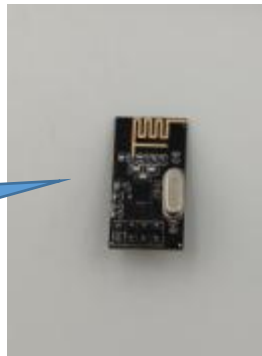
Small Form Factor: The compact size of NRF24L01 modules makes them suitable for projects with limited space.

Multi-Device Connectivity: It enables communication between multiple devices, such as sensor nodes and control nodes.

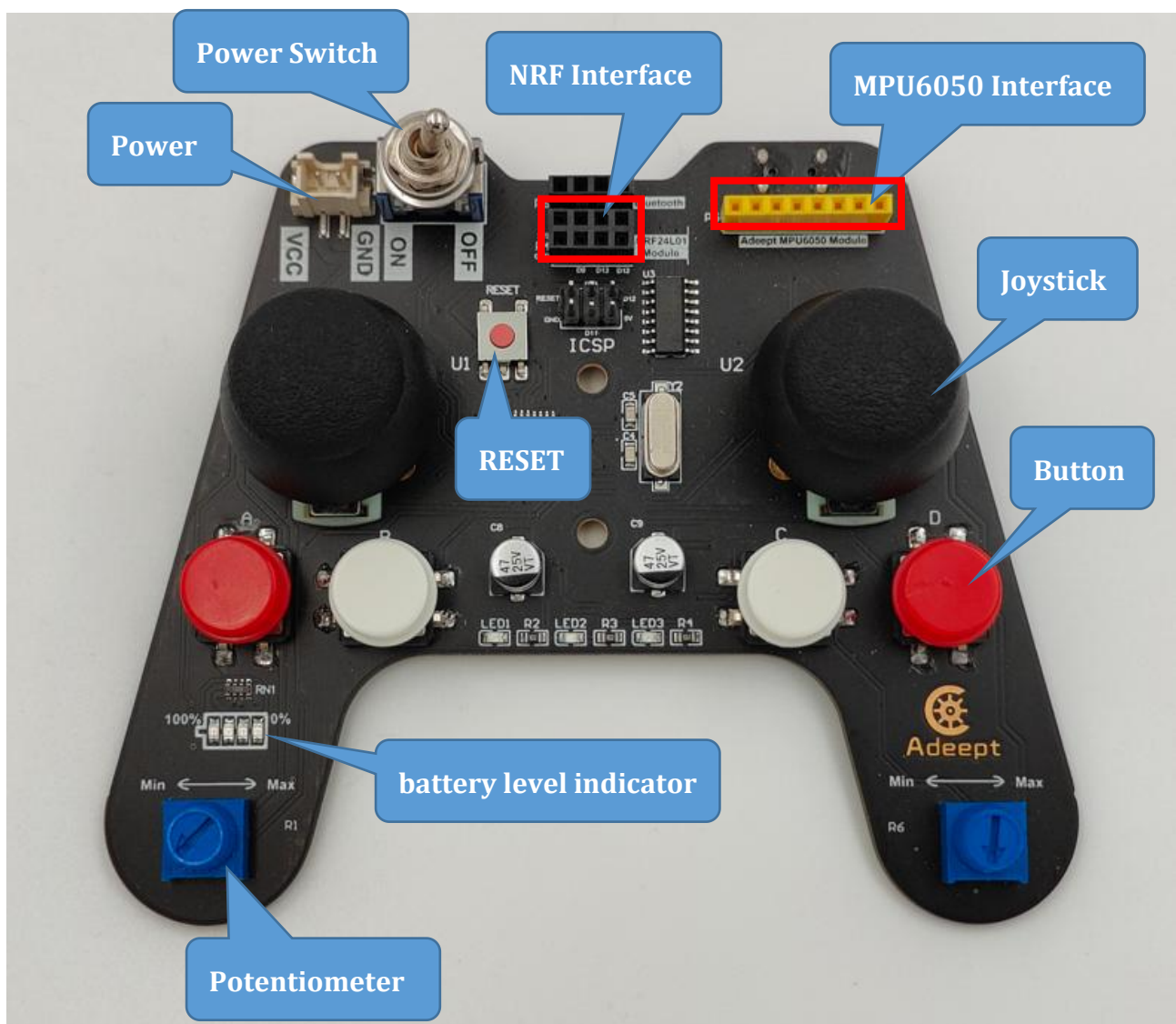
Open Source: The communication protocol and library files for NRF24L01 are mostly open source, facilitating customization and further development.

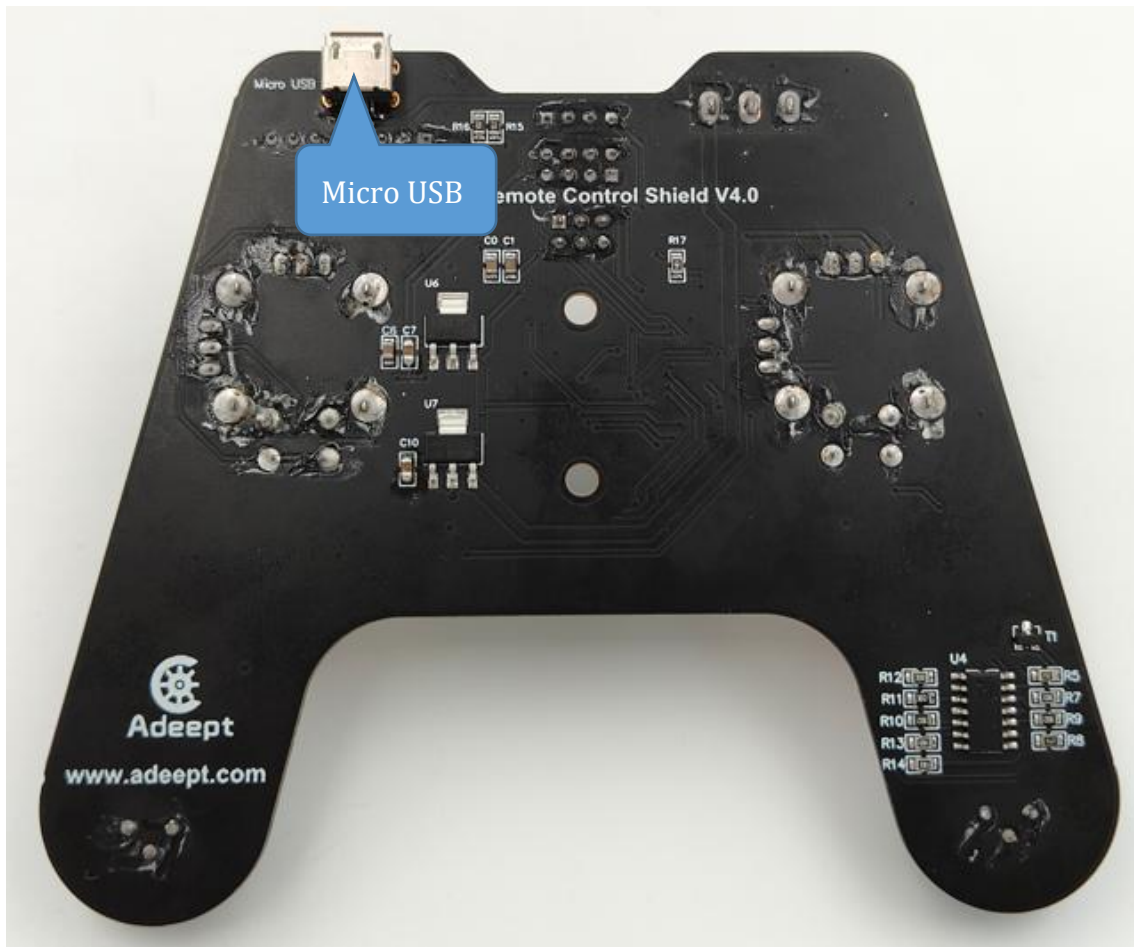
There are usually two types of NRF24L01 modules, the version with external antenna and the version with built-in antenna.

built-in antenna



18.3 Introduction to Handle controller





18.4 Install NRF module and MPU6050 module

Install the NRF module on the handle remote control.

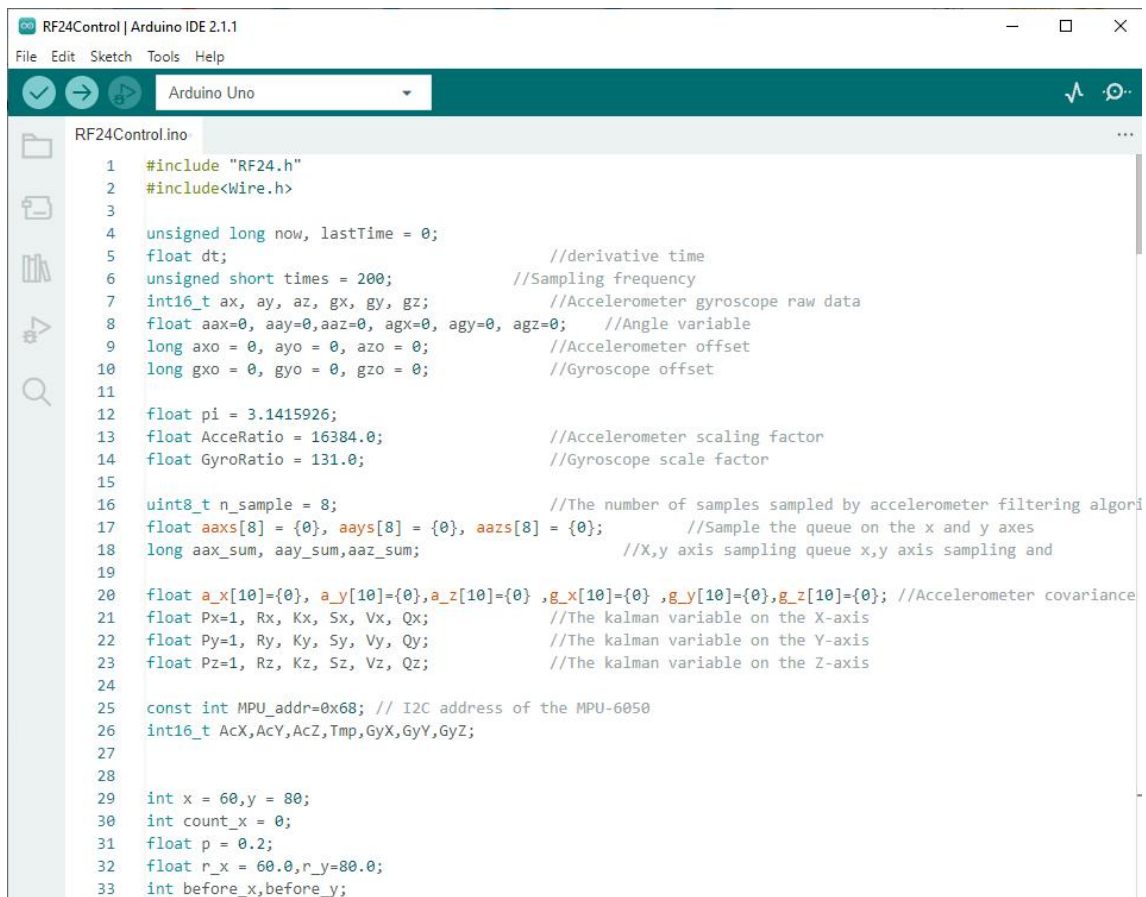


Install the MPU6050 module.



18.5 How to use the Infrared module

1. Connect your computer and Handle Controller with a Micro USB cable.
2. Open "18_NRF_Control_Car\RF24Control" folder in "[Adeept_UnoCar-B/Code](#)", double-click "[RF24Control.ino](#)".



```

1  #include "RF24.h"
2  #include <Wire.h>
3
4  unsigned long now, lastTime = 0;
5  float dt; //derivative time
6  unsigned short times = 200; //Sampling frequency
7  int16_t ax, ay, az, gx, gy, gz; //Accelerometer gyroscope raw data
8  float aax=0, aay=0, aaz=0, agx=0, agy=0, agz=0; //Angle variable
9  long axo = 0, ayo = 0, azo = 0; //Accelerometer offset
10 long gx0 = 0, gy0 = 0, gz0 = 0; //Gyroscope offset
11
12 float pi = 3.1415926;
13 float AccRatio = 16384.0; //Accelerometer scaling factor
14 float GyroRatio = 131.0; //Gyroscope scale factor
15
16 uint8_t n_sample = 8; //The number of samples sampled by accelerometer filtering algorithm
17 float aaxs[8] = {0}, aays[8] = {0}, aazs[8] = {0}; //Sample the queue on the x and y axes
18 long aax_sum, aay_sum, aaz_sum; //X,y axis sampling queue x,y axis sampling and
19
20 float a_x[10]={0}, a_y[10]={0}, a_z[10]={0}, g_x[10]={0}, g_y[10]={0}, g_z[10]={0}; //Accelerometer covariance
21 float Px=1, Rx, Kx, Sx, Vx, Qx; //The kalman variable on the X-axis
22 float Py=1, Ry, Ky, Sy, Vy, Qy; //The kalman variable on the Y-axis
23 float Pz=1, Rz, Kz, Sz, Vz, Qz; //The kalman variable on the Z-axis
24
25 const int MPU_addr=0x68; // I2C address of the MPU-6050
26 int16_t AcX,AcY,AcZ,Tmp,GyX,GyY,GyZ;
27
28
29 int x = 60,y = 80;
30 int count_x = 0;
31 float p = 0.2;
32 float r_x = 60.0,r_y=80.0;
33 int before_x,before_y;

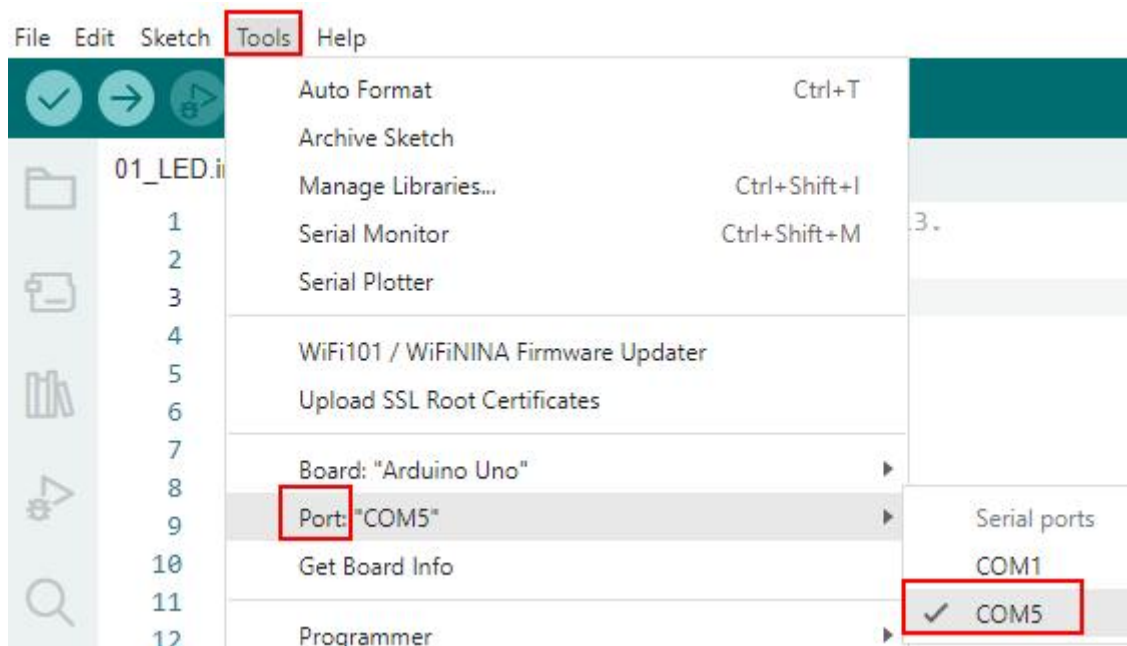
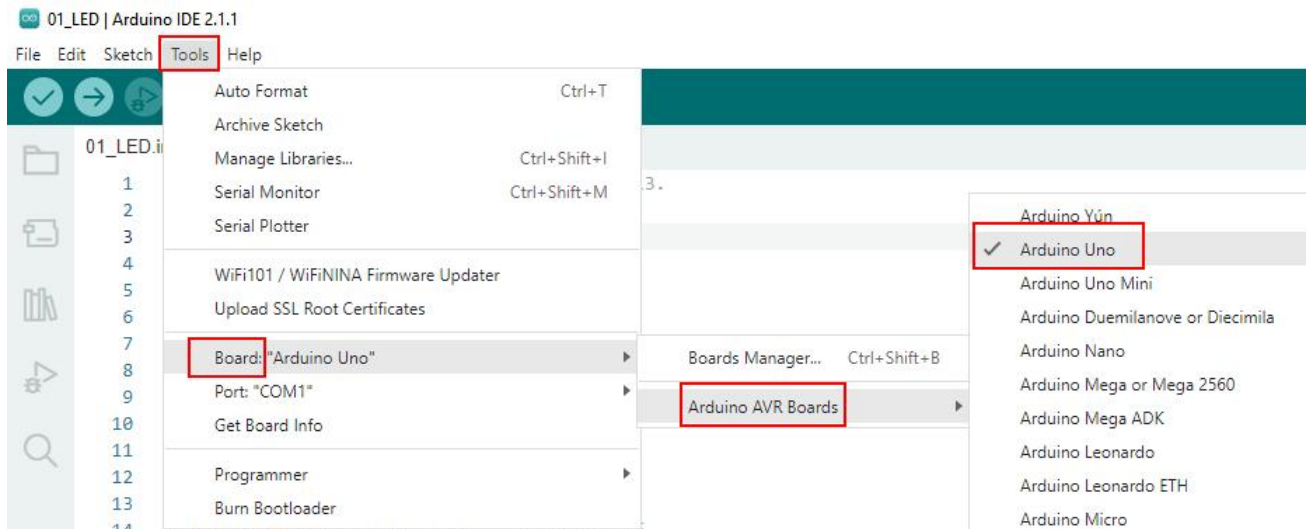
```


3. Select development board and serial port.

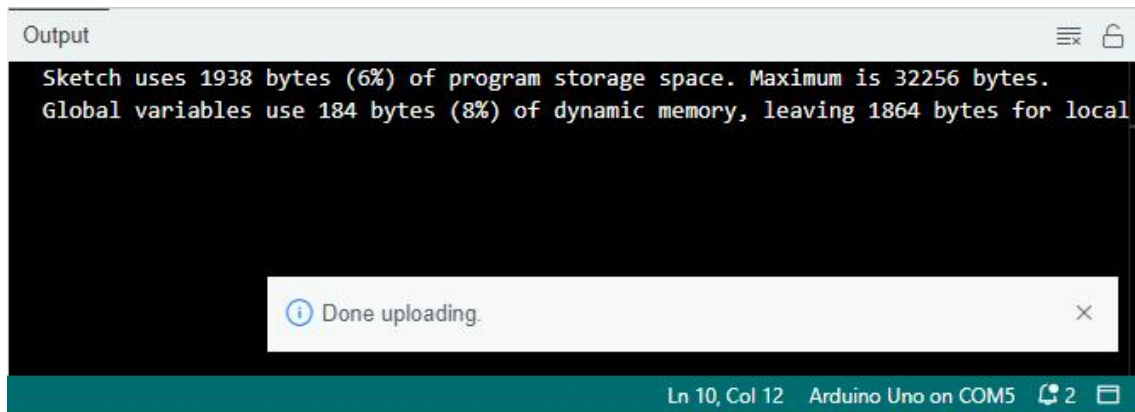
Board: [Tools](#)---->[Board](#)---->[Arduino AVR Boards](#)---->[Arduino Uno](#)

Port: [Tools](#) ---->[Port](#)---->[COMx](#)

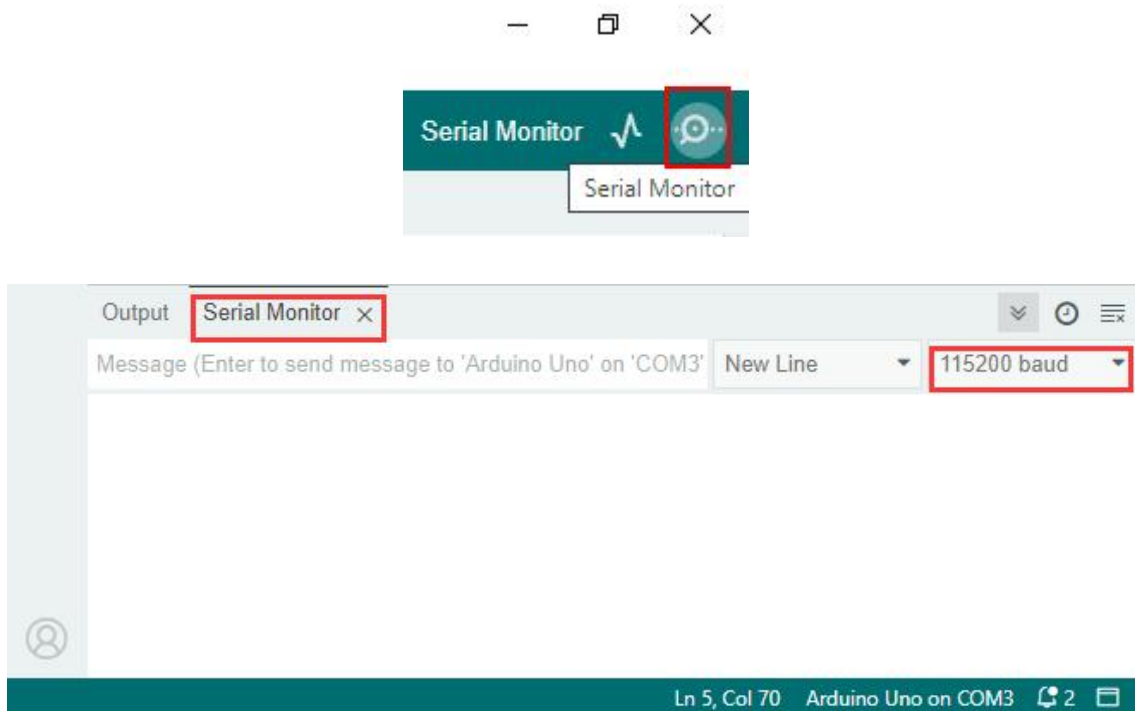
Note: The port number will be different in different computers.



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.



5. click Serial Monitor, Set the baud rate as 115200.

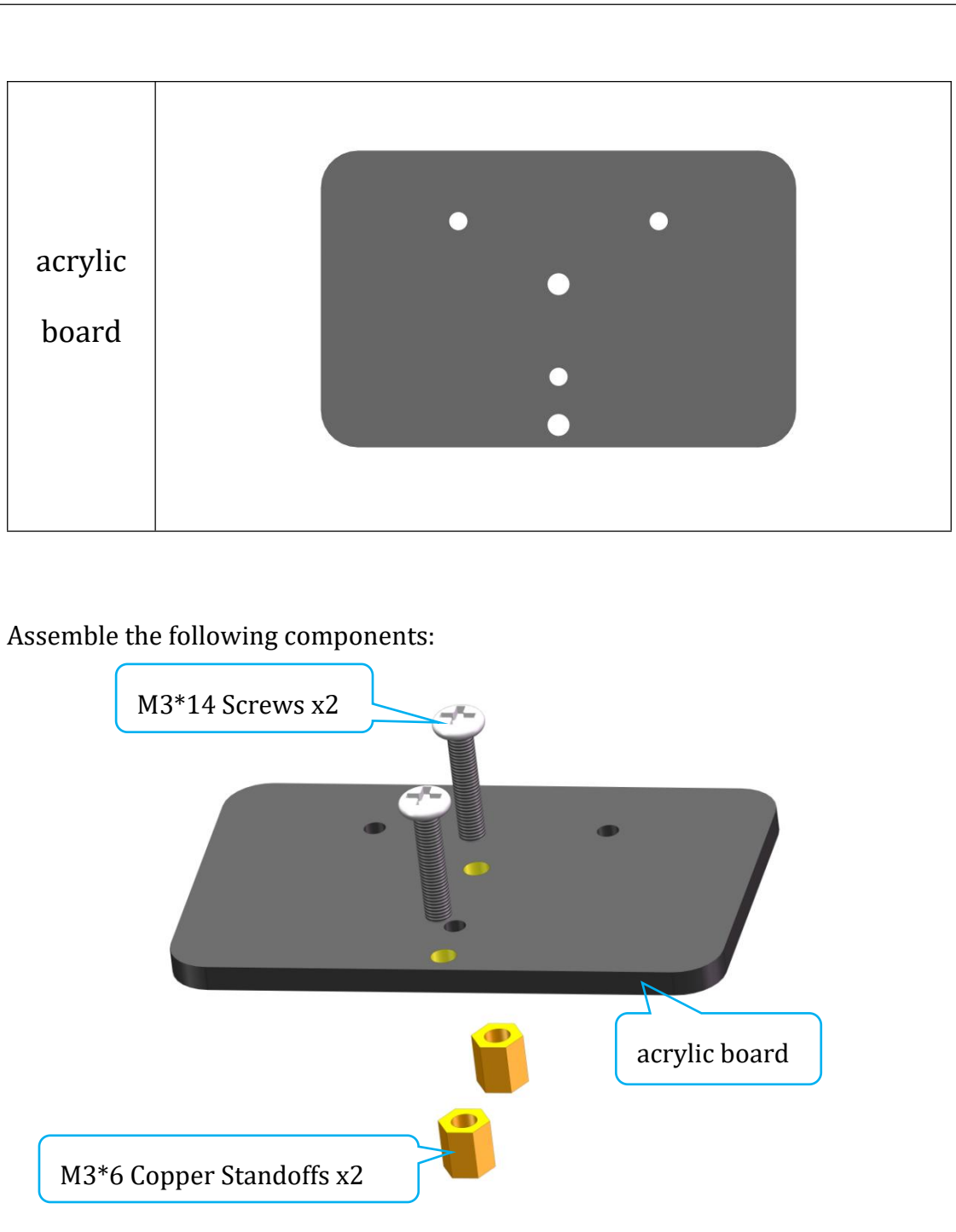


6. After the installation is successful, you can see some information in the interface.

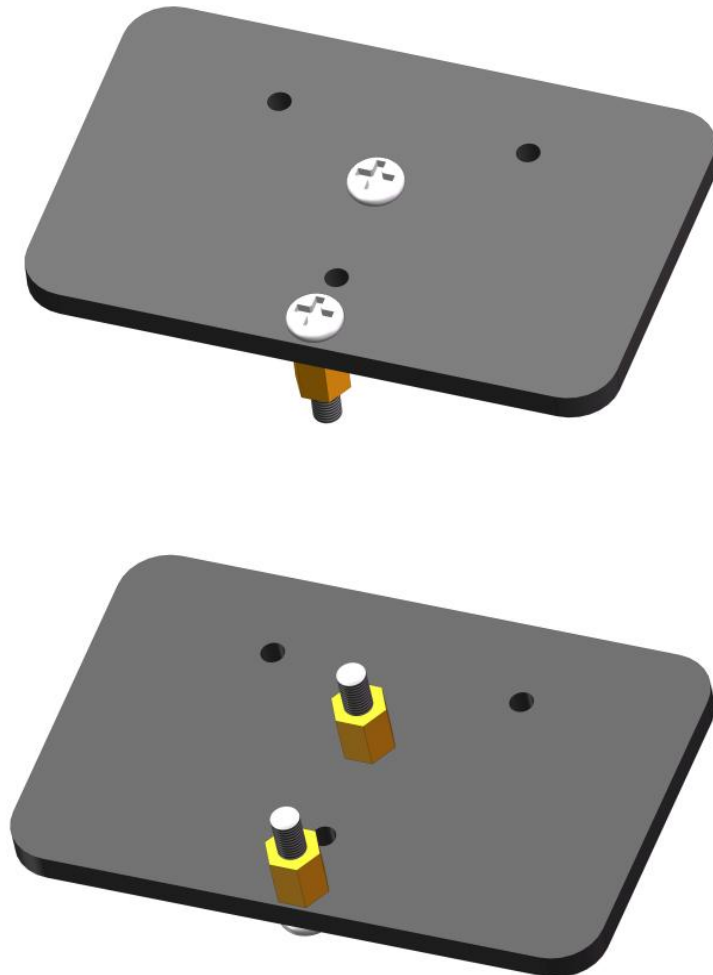
18.6 Install battery box

Assemble the acrylic board

1.1 Use **two M3*6 Copper Standoffs** and **two M3*14 screws** to fix the acrylic board.

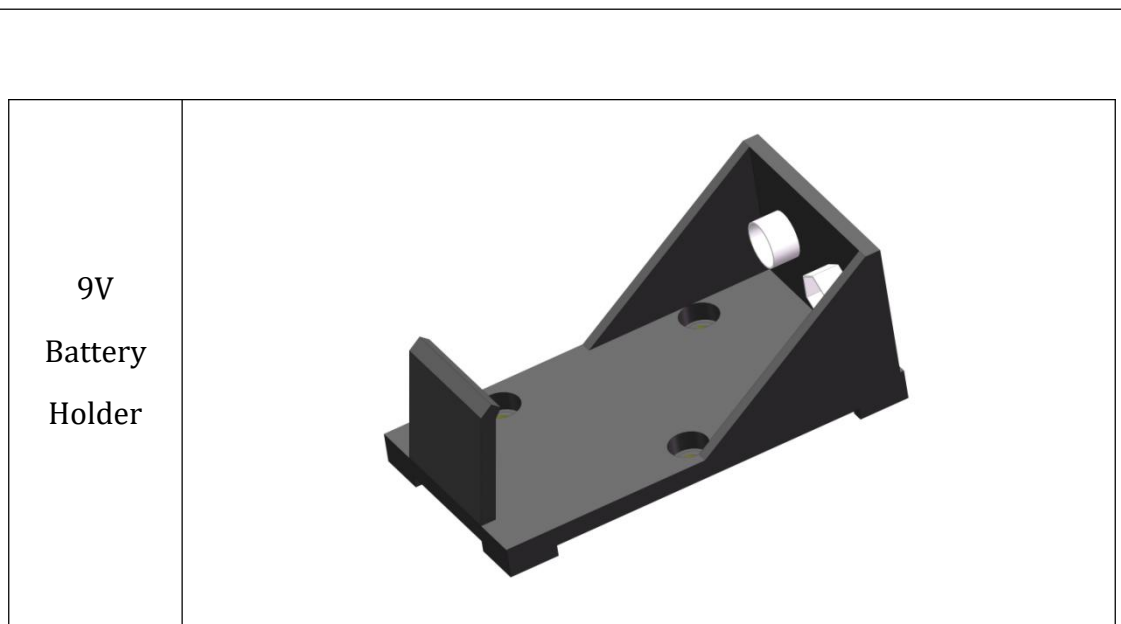


Effect diagram after assembling:

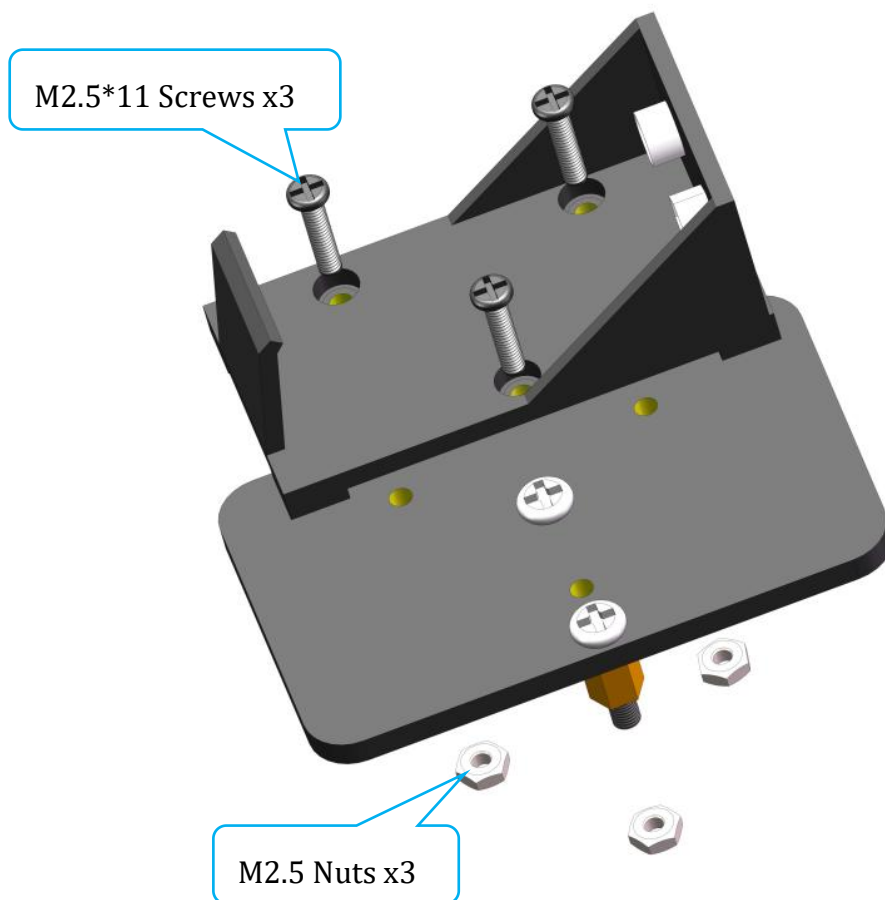


Assemble the 9V Battery Holder

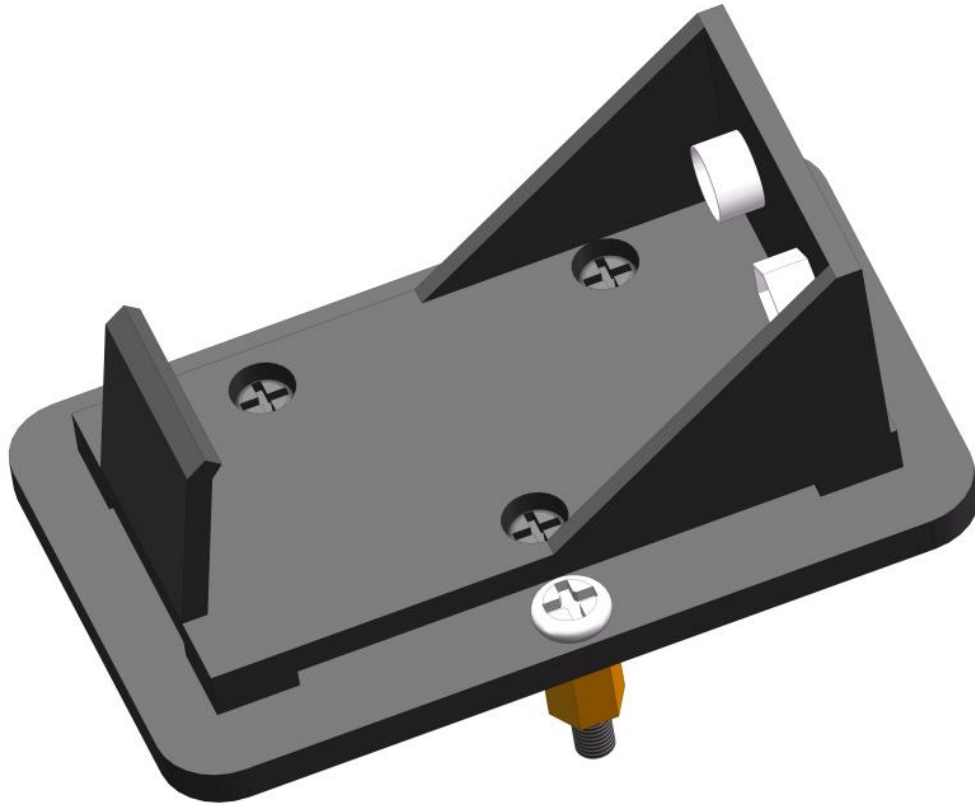
2.1 Use **three M2.5*11 screws** and **three M2.5*11 nuts** to fix the **9v battery holder**.

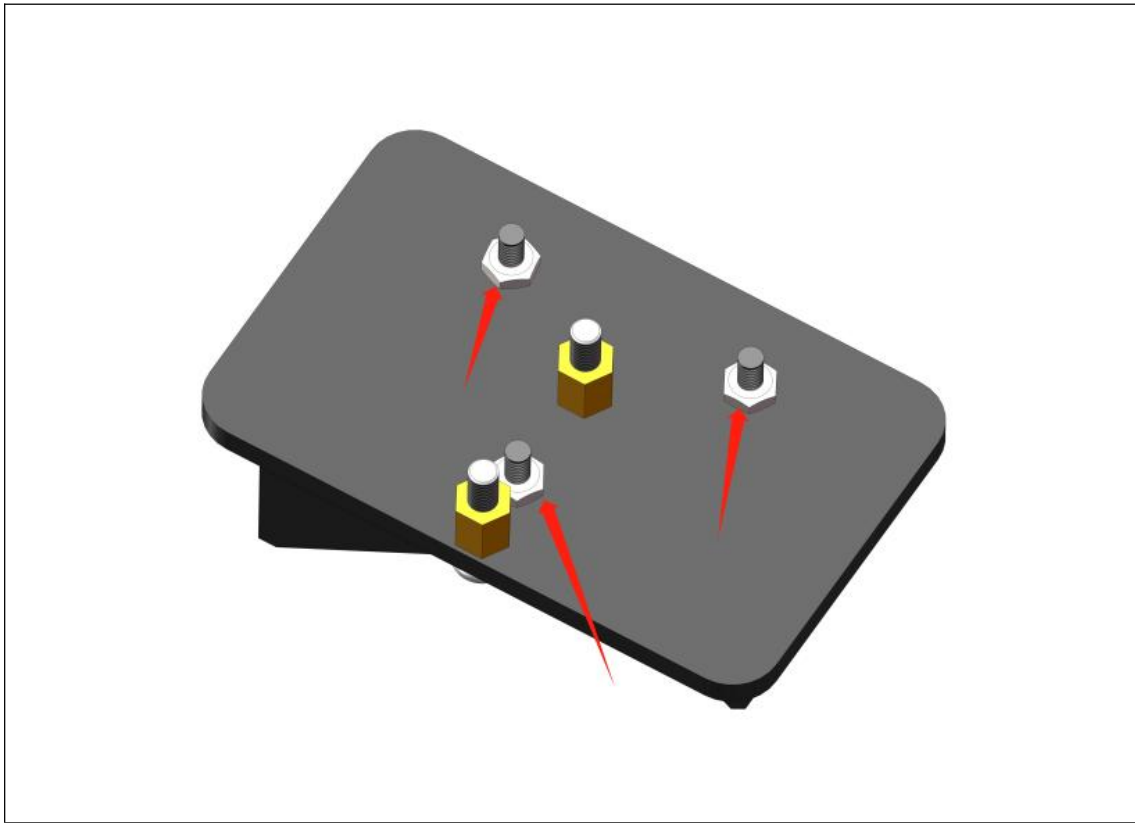


Assemble the following components:



Effect diagram after assembling:

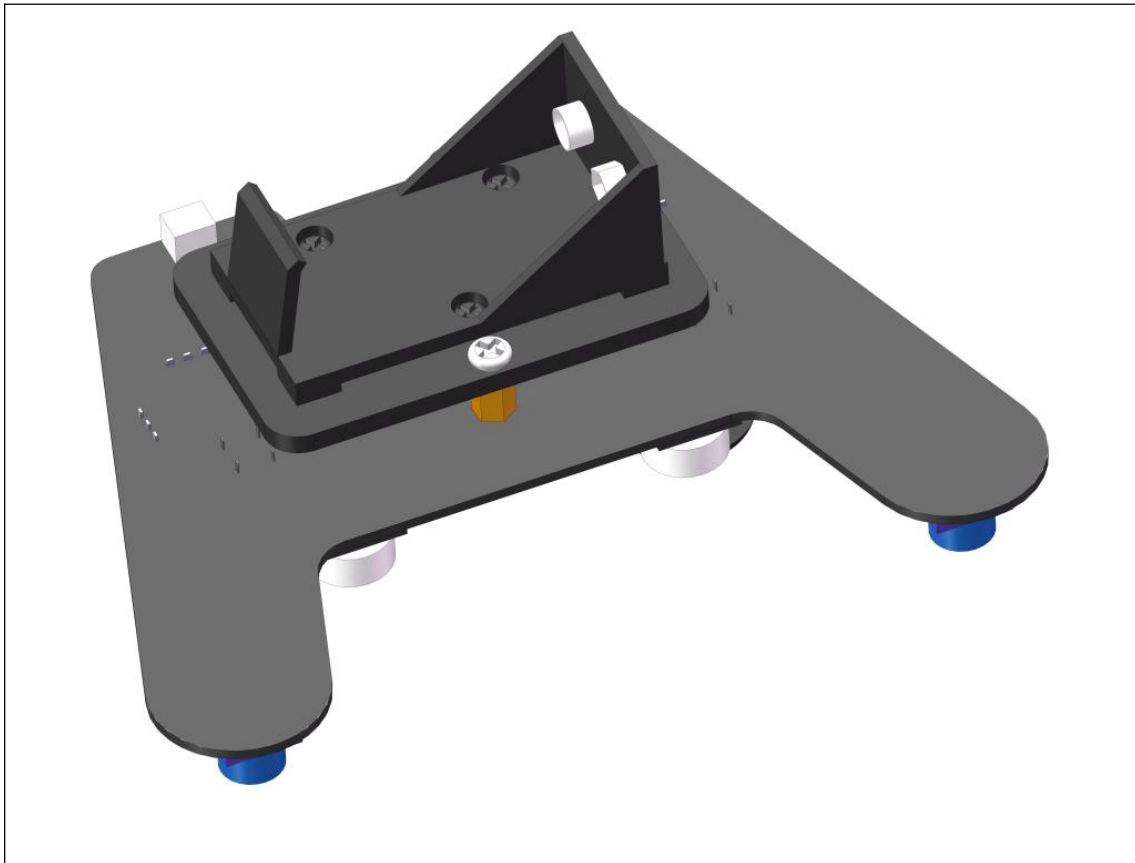




Assemble the Adeept Remote Control Shield

3.1 Install the 9V Battery Holder to the Adeept Remote Control Shield using **two M3 nuts**.



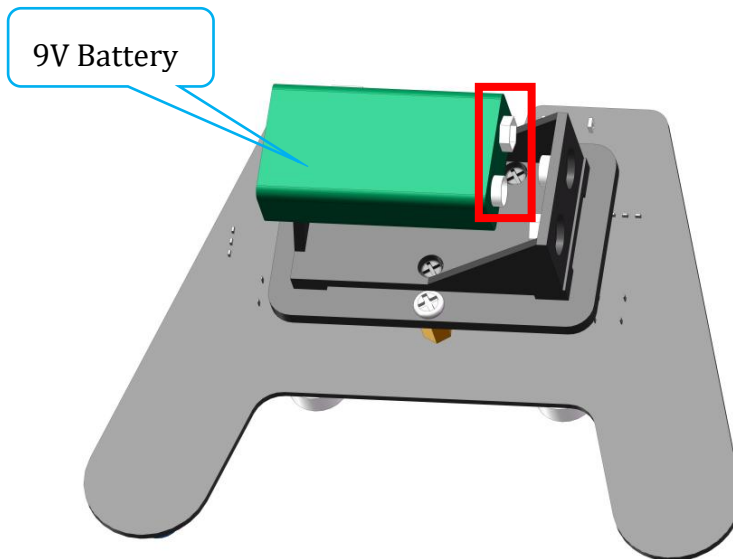


Assemble the 9V Battery Hold

3.2 Install the 9V Battery to the 9V Battery Hold.

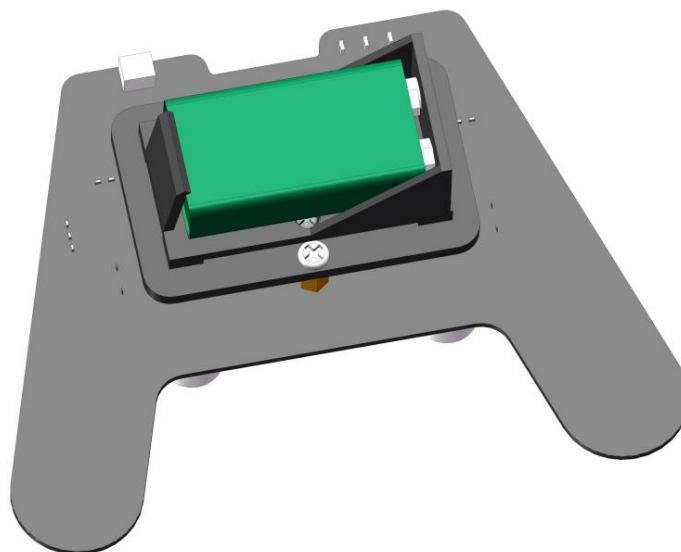


Assemble the following components:



Note: The round port of the battery corresponds to the hexagonal port of the battery holder, and the hexagonal port of the battery corresponds to the circular port of the battery holder.

Effect diagram after assembling:



Connect the circuit correctly and install NRF Module

