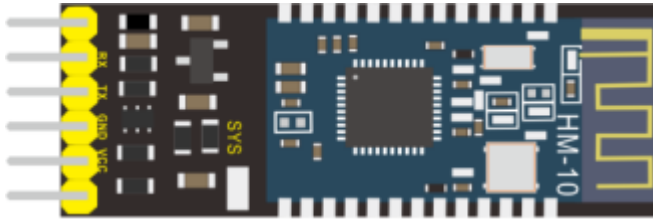


# Project 14 Bluetooth Test



## 1. Description

Bluetooth technology is a wireless standard technology that enables short-distance data exchange between fixed devices and mobile devices, and it builds personal area networks as well(using UHF radio waves in the ISM band of 2.4 to 2.485 GHz).

This is a host-slave device equipped with HM-10 Bluetooth module. The host sends commands to the slave, while the slave only receives.

The HM-10 Bluetooth module supports the Bluetooth 4.0 protocol in not only Android but also iOS system. In the experiment, we take the HM-10 Bluetooth module as a Slave and our mobile phone as a Host. Install the Bluetooth APP on our phone and connect to this module, so that we control smart home kits via Bluetooth.

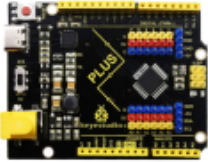
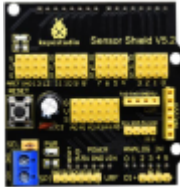
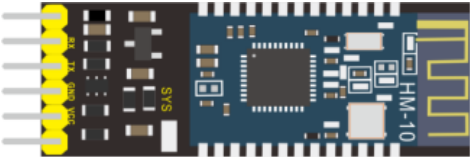
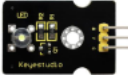

### (1) . Interface Description

Pins	Description
BRK	Input pin(short press to control), or input single pulse of 100ms low level to achieve the following functions: ① When BT is in sleep state, it will be activated to normal state; if open AT+NOTI, serial port will send OK+WAKE. ② It actively requests to disconnect in connected state. ③ If it is in standby mode, it will back to the initial state.
RXD	Serial data inputs
TXD	Serial data outputs
GND	Ground line
VCC	Positive pole of power with an input of 5V
STATE	Output pin, shows the working state of module: Flash slowly in standby state and repeat 500ms pulse; Always light in connected state in a high level; Or you may set light state as you needed.

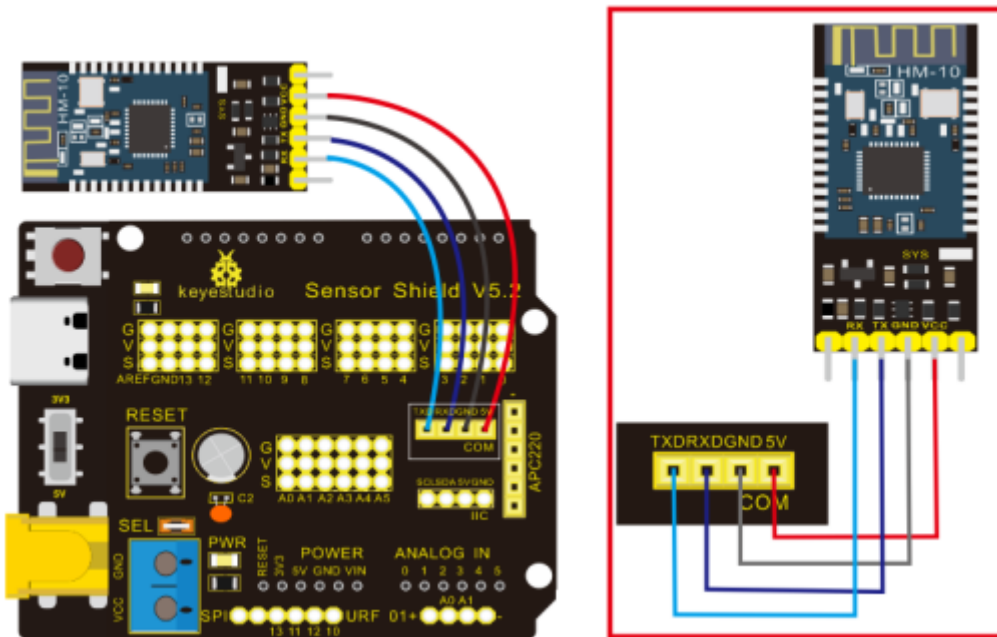
### (2) . Parameters

- Bluetooth protocol: Bluetooth Specification V4.0 BLE
- No byte limit in receiving and sending of serial port.
- 100m ultra-distance communication with phones/pads in an open environment.
- USB protocol: USB V2.0
- Working frequency: 2.4GHz ISM band
- Modulation method: GFSK(Gaussian Frequency Shift Keying)
- Transmission power: -23dbm, -6dbm, 0dbm, 6dbm, which can be modified by AT command
- Sensitivity:  $\leq -84\text{dBm}$  at 0.1% BER
- Transmission rate: 6K bytes for asynchronous and synchronous
- Security feature: Authentication & encryption
- Supporting service: Central & Peripheral UUID FFE0, FFE1
- Power consumption: Auto-sleep mode with stand by current of 400uA~800uA; current is 8.5mA during transmission.
- Power supply: 5V DC
- Working temperature:  $-5 \sim +65^{\circ}\text{C}$

## 2. Needed Components

PLUS control board*1	Expansion board*1	HM-10 BT module*1	White LED*1	USB cable*1
				

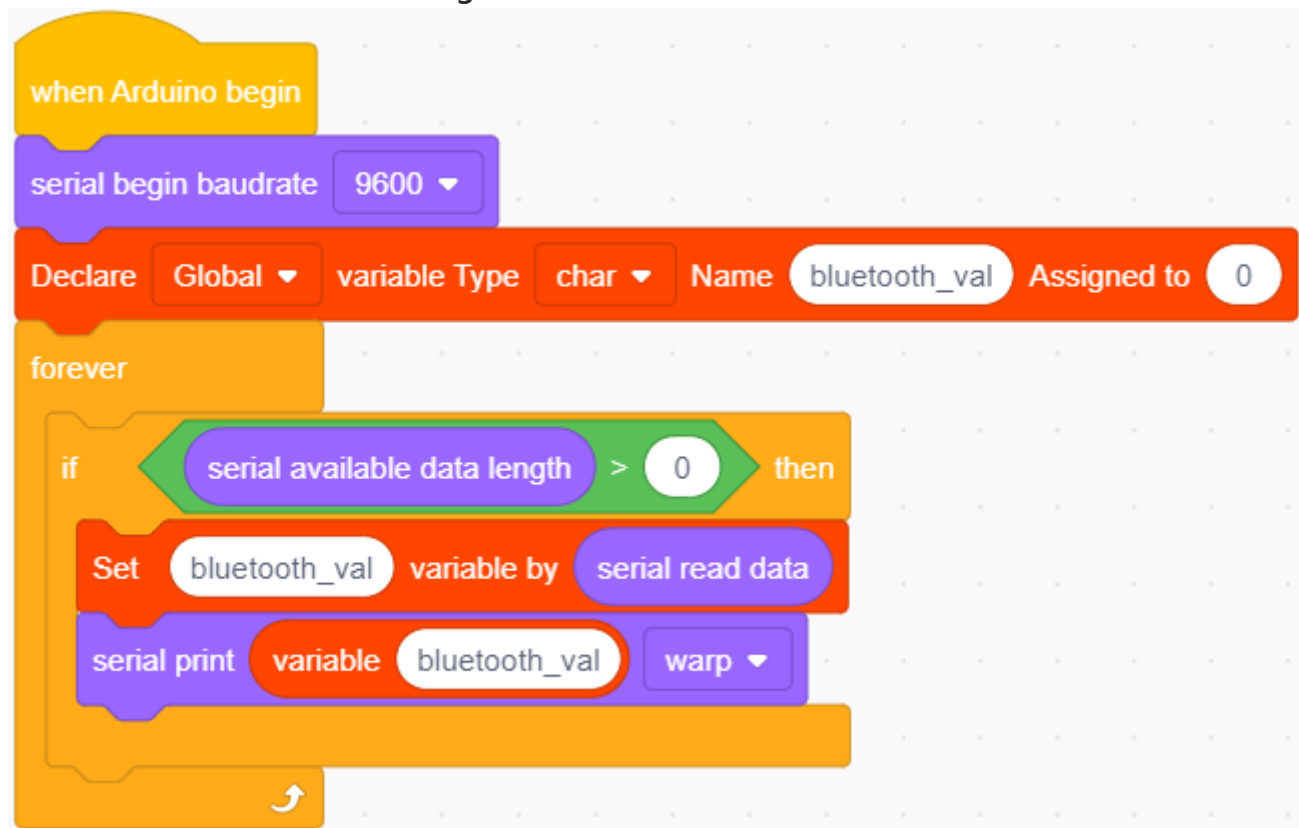
## 3. Wiring Diagram



On the sensor expansion board, the RXD, TXD, GND, and VCC of the Bluetooth module are respectively connected to TXD, RXD, GND, and 5V, and the STATE and BRK pins of the Bluetooth module do not need connecting.

## 4. Test Code 1

### Read Bluetooth Character Strings



Pay attention: Remove the Bluetooth module please when uploading the test code. Otherwise, the code will fail to be uploaded.

## 5. Bluetooth APP download

In the previous, we've introduced the basic parameter principle of HM-10 Bluetooth module. In this project, let's show you how to use the HM-10 Bluetooth module. To efficiently control this kit, we specially designed an APP as shown below.




There are twelve control buttons and four sliders on App. When we press control button, the Bluetooth sends a control character and the module will receive a corresponding counterpart. When programming, we set the corresponding function of each sensor or module according to the corresponding key control character. We will test 16 buttons on app in the following parts.

### (1) Android Mobile/Pad:

**Note:** You need to enable the location information before connecting to HM-10 Bluetooth module via cellphone, otherwise, Bluetooth may not be connected.

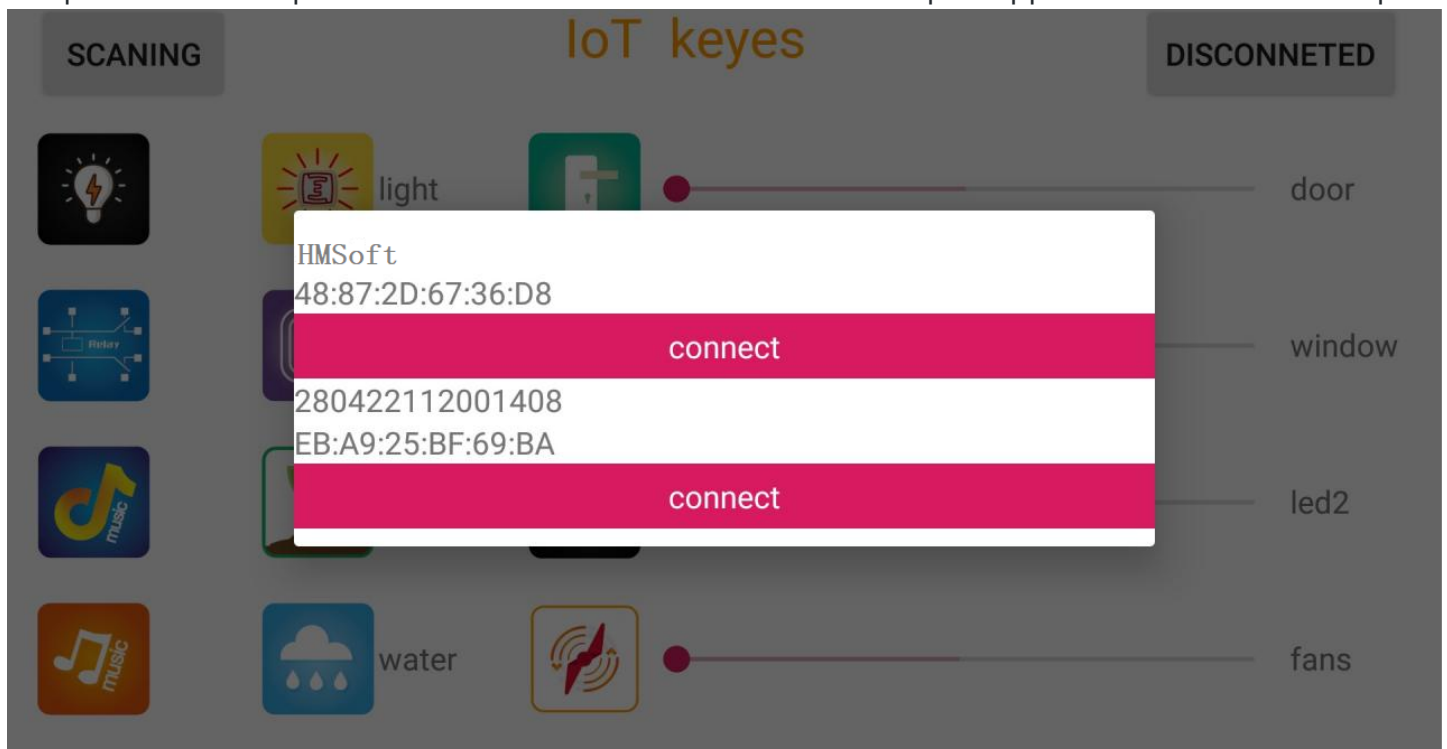
A. Enter Google play and search "keyes IoT". Download the app in APP Store or from:  
[https://play.google.com/store/apps/details?id=com.keyestudio.iot\\_keyes](https://play.google.com/store/apps/details?id=com.keyestudio.iot_keyes)



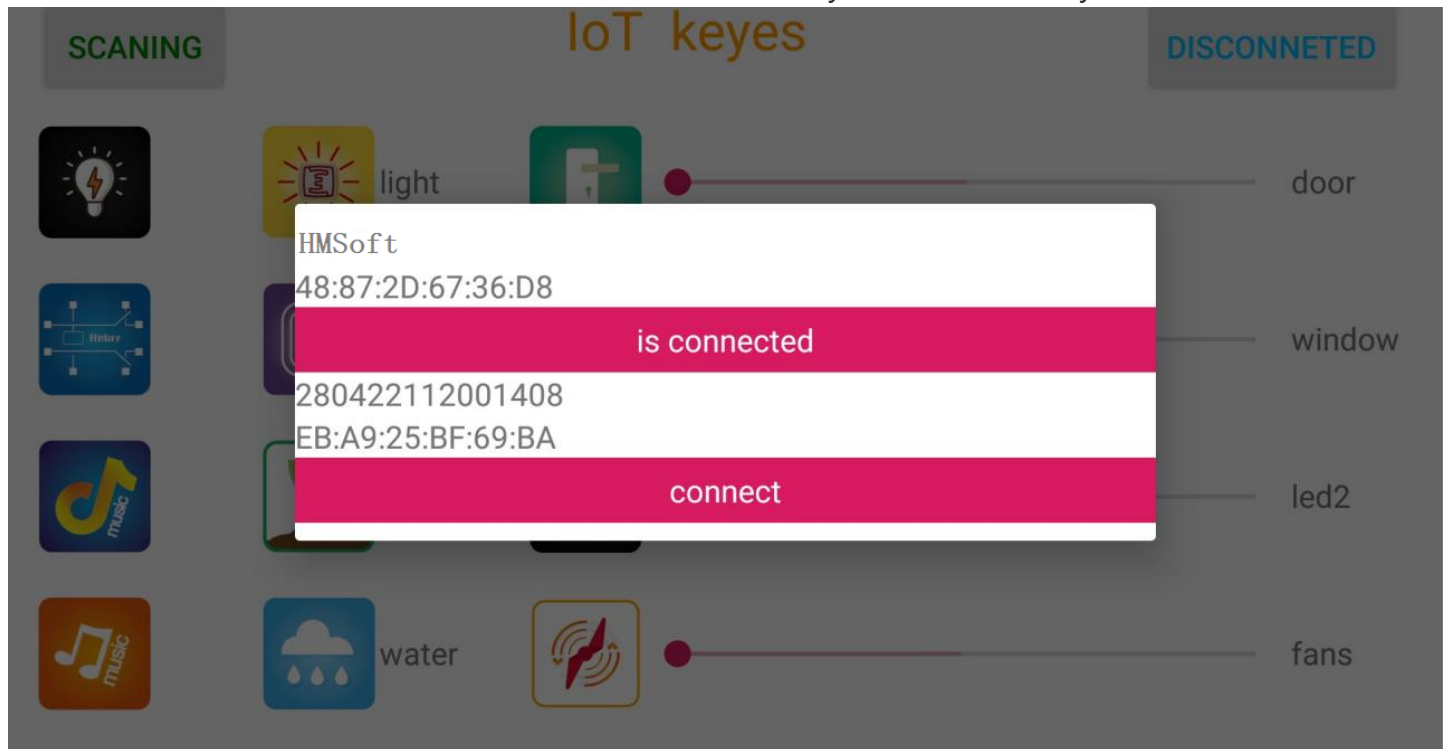
Click  to open APP, and the following interface will pop up:



B. Upload code and power on. LED of Bluetooth module blinks. Open App to click "SCANNING" to pair.



C. Click "**connect**", then Bluetooth is connected successfully(indicator is always on) as shown below:



## (2) iOS System

A. Open App Store.



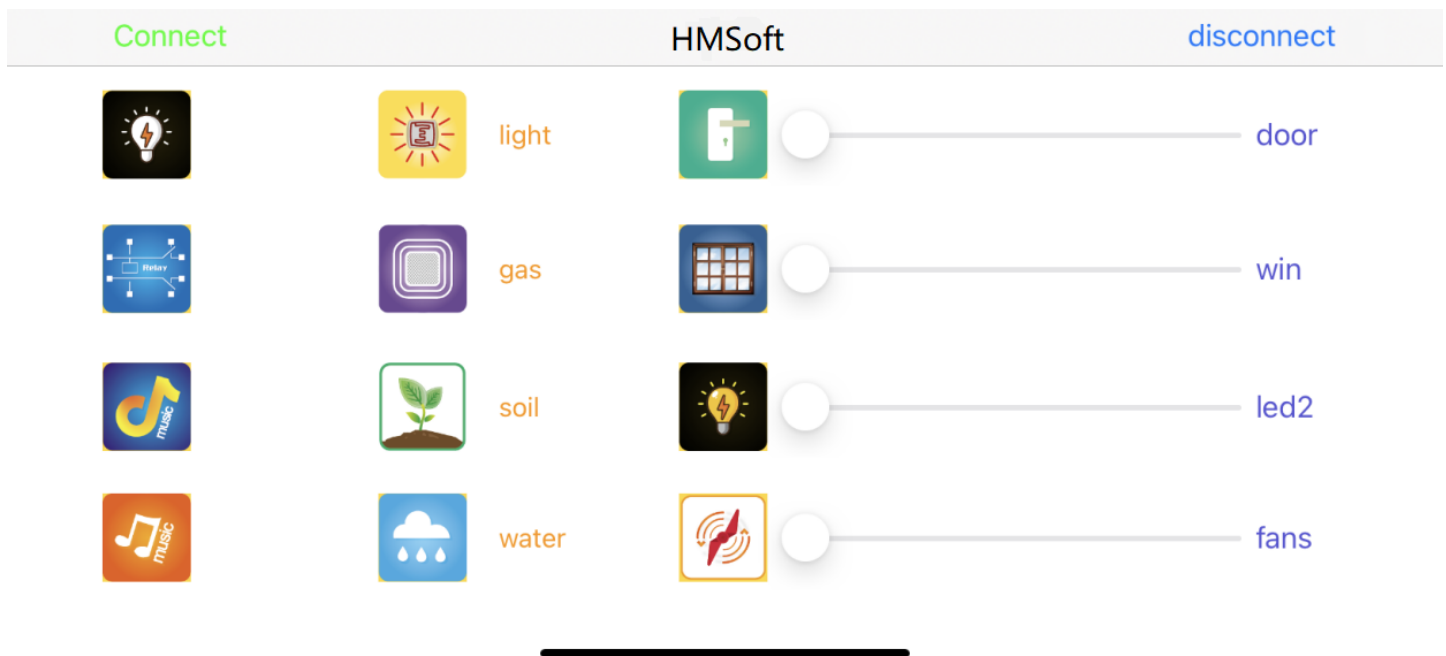
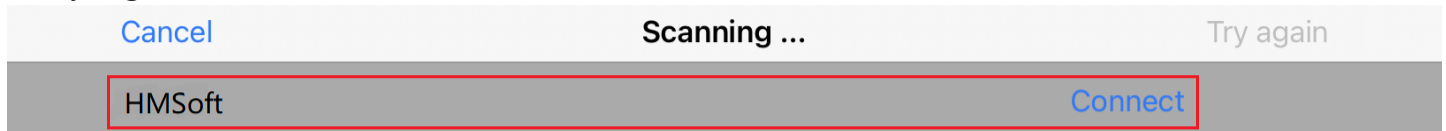
B. Search "IoT keys" in APP Store, and click "**Download**".



C. Tap IoT keyes to enter the interface as follow:



D. Click "Connect" and HMSoft to pair the Bluetooth. After paring successfully, the red indicator will always light on.



16 control button are preserved in the APP. After APP and HM-10 being successfully connected, tap the control button on APP.  
When we press control button, the Bluetooth sends a control character and the module will receive a




corresponding counterpart.

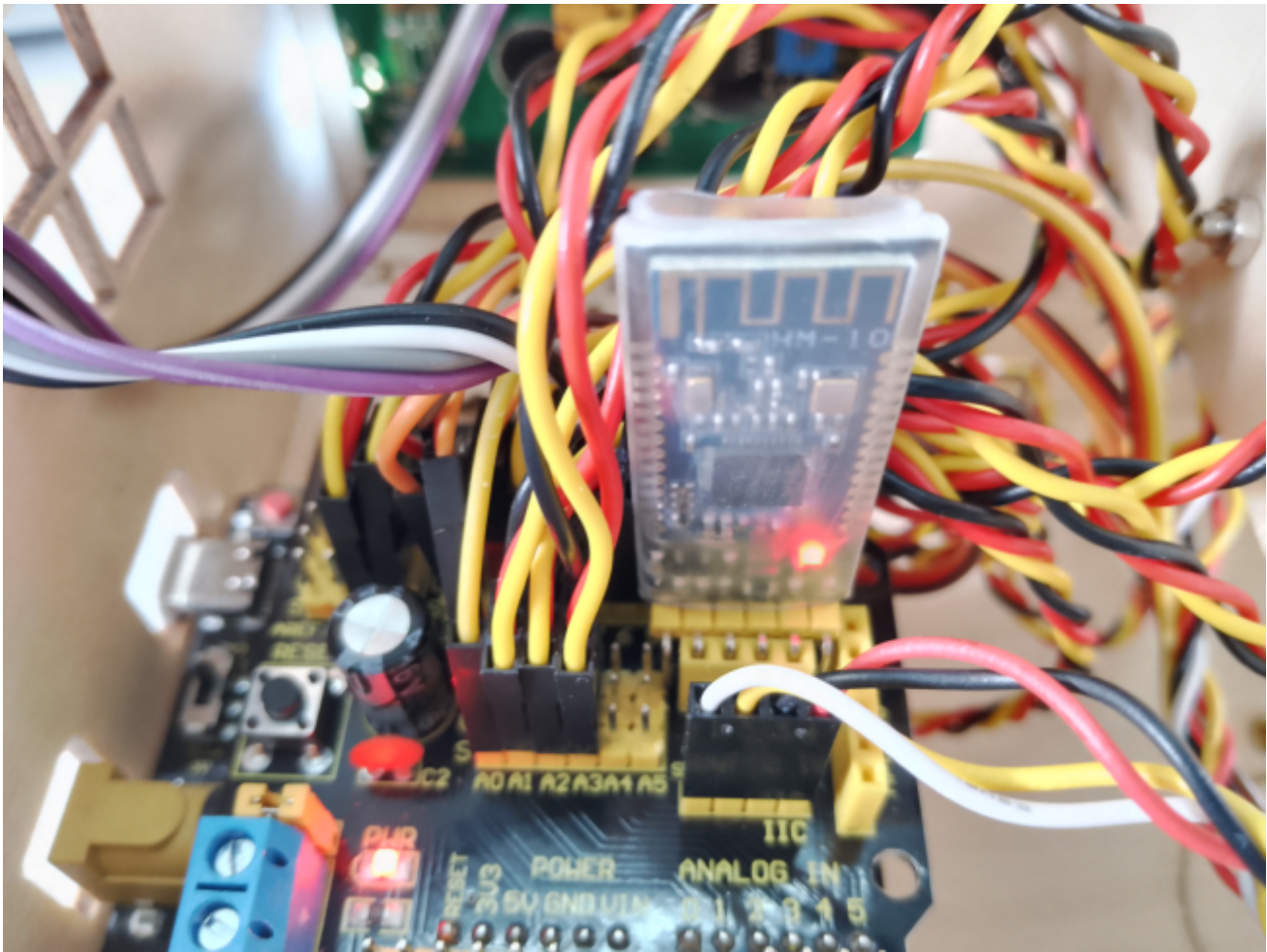
When programming, we set the corresponding function of each sensor or module according to the corresponding key control character.

## 6. Test Result 1

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Upload test code and plug Bluetooth on the expansion board. Open the APP to pair with it.

Click  on the serial monitor to set the baud rate to 9600. Tap the buttons on APP and we can see corresponding characters below:



a  
b  
c  
d  
e  
f  
g  
h  
i  
j  
k  
S  
S

⏏

🗑

Buadrate9600▼

End of lineLF & CR▼

Hex form☐

Auto scroll☒

Send

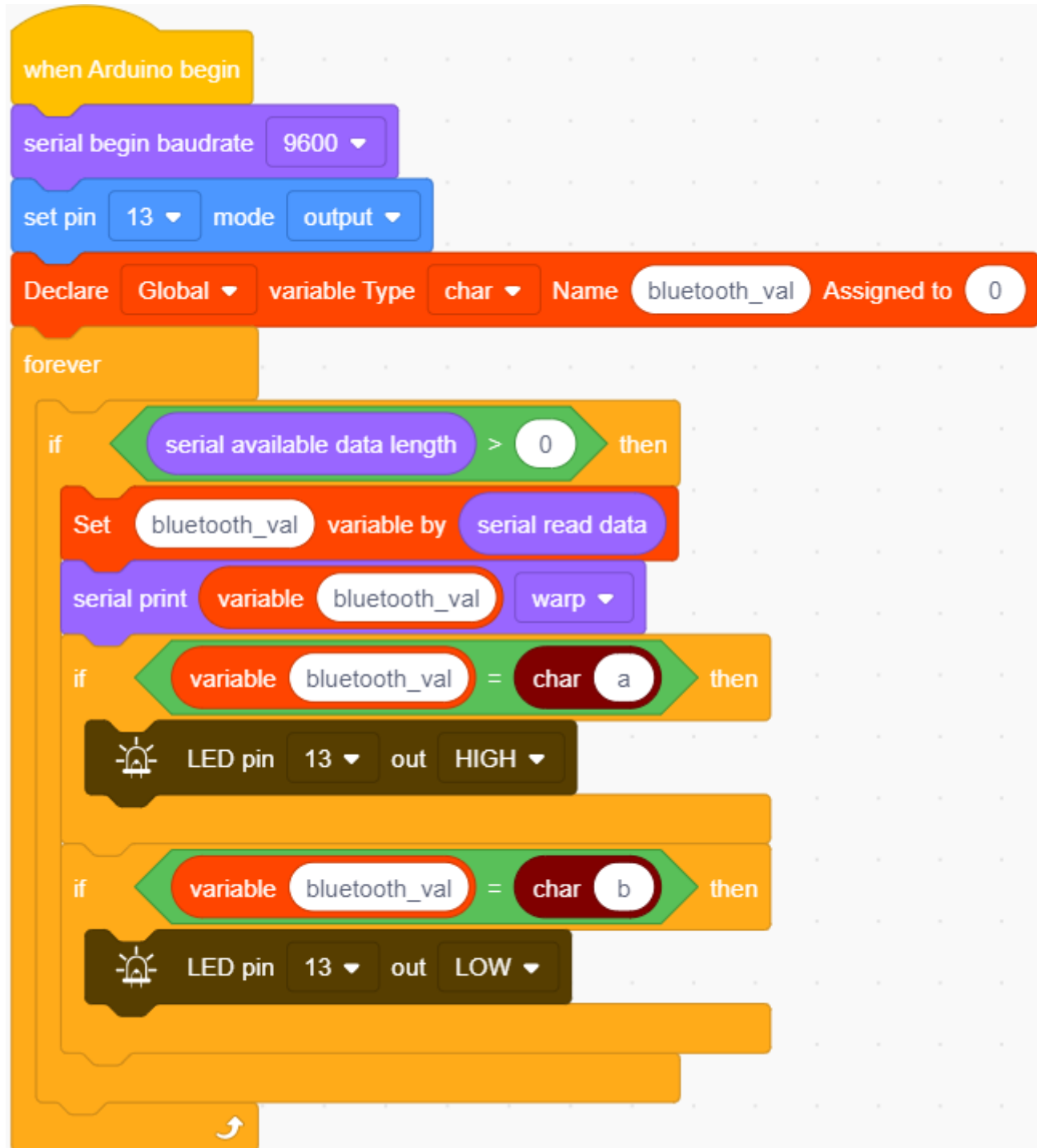
⚙

We can call a functional list through tests(ios is basically the same)</span> )

No.	Button	Control Character	Function	No	Button	Control Character	Function
1	SCANNING		Pair and connect to HM-10 Bluetooth module	2	DISCONNECT		Disconnect Bluetooth
3		Click to send "a", click again to send "b"	Click to turn on white LED, click again to turn off LED	4		Click to send "c", click again to send "d"	Click to turn on relay module; click again to turn off relay module
5		Hold and press to send "e" release to send "g"	Click to play music	6		Hold and press to send "f" release to send "g"	Click to play music (alternative song)
7		Click to send "h", click again to send "s"	Click to turn on photocell sensor, light shows the data; click again to turn off photocell sensor	8		Click to send "i" click again to send "S"	Click to turn on gas sensor, gas displays the detected data; click again to turn off gas sensor
9		Click to send "j" click again to send "S"	Click to turn on soil humidity sensor, soil shows data, click again to turn off soil humidity sensor	10		Click to send "k" click again to send "S"	Click to turn on steam sensor, water displays the detected data; click again to turn off steam sensor
11		Click to send "l" ; click again to send "m"	Click to open the door; click again to close the door	12		Drag slider to send "t 50 #", 't' represents initial character; 50 is the angle of servo 1 ; '#'implies termination character	Slider controls the angle of servo 1 to rule the door, door displays the angle value of servo 1
13		Click to send "n"; click again to send "o"	Click to open the window; click again to close the window	14		Drag slider to send "u 34 #", 'u' represents initial character; 34 is the angle of servo 2; '#' stands for termination character	Slider controls the angle of servo 2 to rule the window, win shows the angle value of servo 2
15		Click to send "p" ; click again to send "q"	Click to turn on LED; click again to turn off LED	16		Drag slider to send "v 100 #", 'v' represents initial character; 100 is the PWM value of led2; '#' stands for termination character	Slider controls LED brightness, led2 displays brightness value
17		Click to send "r" ; click again to send "s"	Click to turn on fan; click again to turn off fan	18		Drag slider to send "w 153 #", 'w' represents initial character; 153 is the PWM value of fan ; '#'stands for termination character	Slider controls rotation speed, fans indicates the rotation speed value

## 7. Test Code 2



Bluetooth controls LED



Note: Remove the Bluetooth module please when uploading the test code. Otherwise, the code will fail to be uploaded. Remember to pair Bluetooth after uploading the code.

## 8. Test Result 2

Upload test code and plug Bluetooth on the expansion board. Open the APP to pair with it.

Tap  to light the white LED up, and tap again  to turn it off.



