

LAB-4

Section 1: Bluetooth Interface

In the lab, we will cover how to use a Bluetooth attachment with the Arduino and how to communicate with it using your phone.

Learning Parts:

- Learn how to use the HC-06 Bluetooth module and the Bluetooth APP
- Learn how to communicate via Bluetooth and
- Write programs to implement this function

Preparations:

- A vehicle (equipped with battery)
- A USB cable
- A HC-06 Bluetooth module
- An Android mobile phone or tablet

Bluetooth module

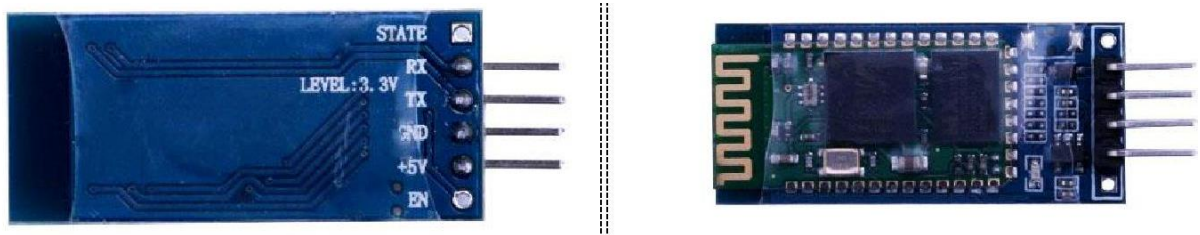


Figure 1: Bluetooth Module

The description of HC-06 module:

1. Adopt mainstream Bluetooth chip of CSR, protocol standard of Bluetooth V2.0
2. Analog working voltage of serial port is 3.3V
3. Users can set baud rate 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200
4. Dimension of key module is 28mm x 15 mm x 2.35mm
5. Working electric current: 40mA
6. Dormancy electric current: less than 1mA

7. Being used for GPS navigation system, hydroelectric gas reading system, industrial field mining control system

8. Can be connected to Bluetooth laptop, computer with Bluetooth adapter, PDA, etc.

This is the schematic diagram of Bluetooth module connected to controller board:

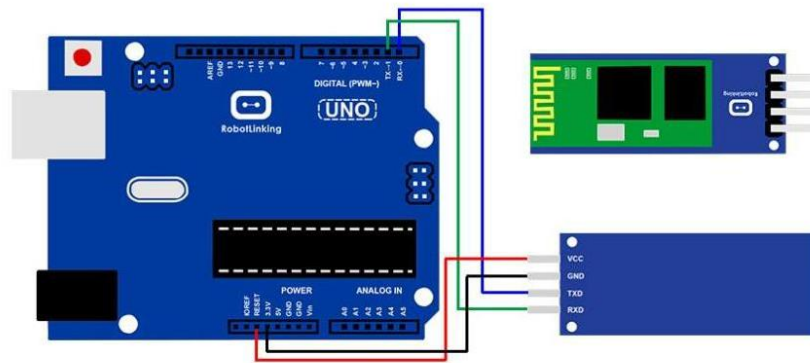


Figure 2: HC-06 connection to Arduino Uno

In the experiment, we will connect it to UNO board via expansion board V5.

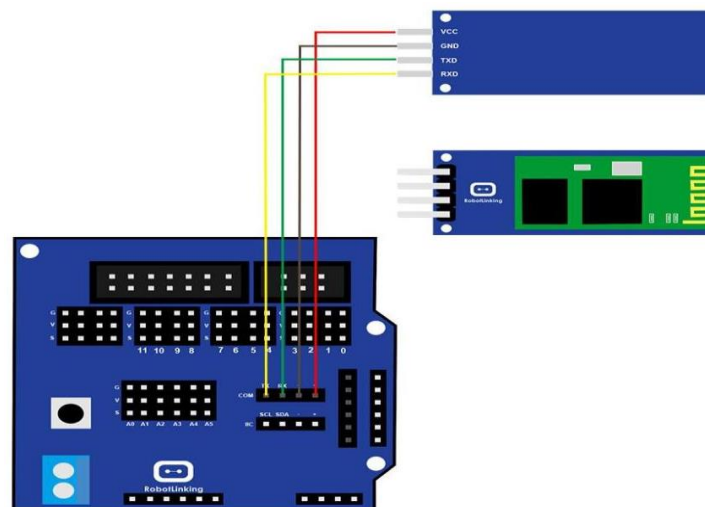


Figure 3: HC-06 connection to expansion board

Application for Bluetooth Module

Down load the APK ([com.shenyaocn.android.BlueSPP.apk](#)) software for android phone from Moodle and install the APK and then run it on your phone. It will show as blow and advise you to turn on Bluetooth function when you run it.

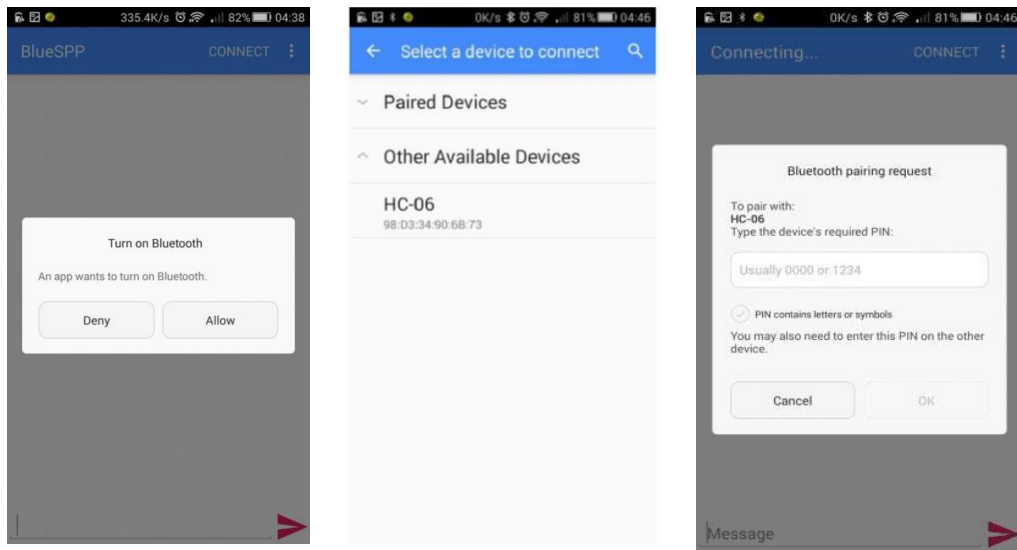


Figure 4: In app message

Then you phone will search Bluetooth equipment nearby, and click HC-06, it will show “password is needed”, and it will work when you enter 0000 or 1234.

The app interface will be as shown below:

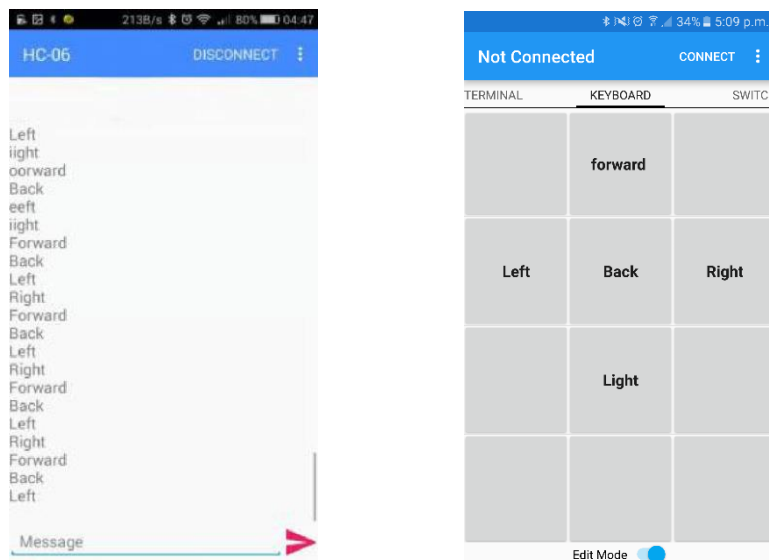


Figure 5: In-app Communication window

Section 2: Example Code

Caution: Take out the Bluetooth module every time you programme the Arduino as Bluetooth module also uses the same programming pins. Without this you won't be able to upload the sketch.

In this example, you simply need an Arduino board, Two LEDs and Bluetooth Module.

Connect two LEDs on your breadboard with corresponding resistors to Arduino digital PIN 6 and PIN 7. After that download and open the file **Bluetooth_example.ino** from Moodle,

Upload the sketch to the UNO board, disconnect it from the computer and give Arduino power from batteries. Now scan for available Bluetooth devices and connect with the Bluetooth module named as HC-06. After connection, write '**f**' or '**s**' in chat window of mobile app to turn the LEDs **ON** or some other key to **turn both OFF**.

Section 3: Solve the challenge

You need to write program and build circuit for the given challenges and show the result to Lab Demonstrators and get your Lab report signed.

3.1 Bluetooth control stepper motor

In this task, you have to write a sketch which will control the direction of Stepper Motor using Bluetooth. Stepper Motor should move to Left, Right or Front directions depending upon below mentioned characters. You should send: -

- "**L**" to move stepper motor to left direction
- "**F**" to move stepper motor to front direction
- "**R**" to move stepper motor to **left direction**

Display error message "**Please Enter L or F or R**" in case of any other key is sent and program should wait until right character is entered.

When **L**, **F** or **R** is received to Arduino, stepper motor should turn to **Left**, **Front** or **Right** direction respectively, and send back (*to Mobile Application*) the **corresponding side distance** using Ultrasonic Sensor (as used in Lab 2).

Along with the above part, attach a LCD to the circuit displaying the above measured distance in the format below:-

e.g - Front distance = 50 cm (displayed in 2nd row)

If distance in any direction is less than 12 cm, below message should be displayed at LCD "**Unsafe to move** " (displayed in 4th row)

LAB-4 END