

## Lab 2: Introduction to Bluetooth Communication

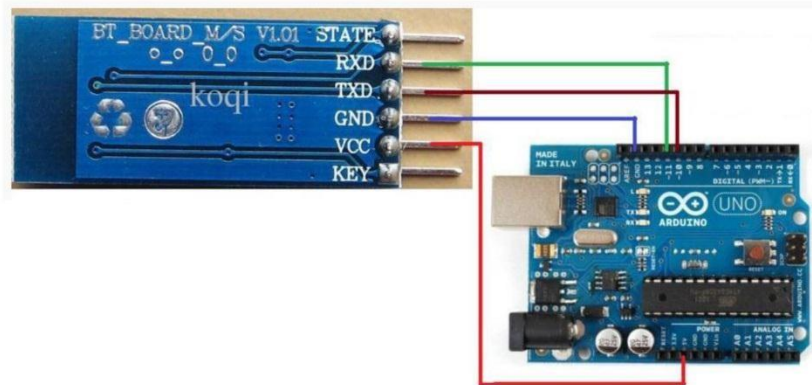
**Instructions:** There are two activities for this lab. Show your working setup to your TA after completion to receive full credit. You don't submit anything for this lab.

**Introduction:** The HC05 Bluetooth module offers an affordable way to let your microcontroller talk to your Bluetooth devices such as Bluetooth mobile phone, laptop, and Bluetooth adapter. This lab will introduce us to how to transmit data wirelessly to a remote laptop or computer, and control a device from a remote computer.

### Bluetooth setup

Connect your Bluetooth to Arduino with the help of the figure below

This module allows you to integrate a microcontroller into a Bluetooth® network.



Arduino		HC05
3.3 V	▶	VCC
GND	▶	GND
D11	▶	Rx
D10	▶	Tx
<b>Pin Layout</b>		
KEY		if brought high before power is applied, forces AT Command Setup Mode; blinks slowly (2 seconds)
VCC		power supply
GND		ground
TXD		transmit serial data
RXD		receive serial data
STATE		tells if connected or not

## **Activity 1.0 Send the message, “Hello Biomeasurement lab!” wirelessly to a remote computer (40pts.).**

### **Procedure:**

1. Connect the Arduino board with the Bluetooth to your desktop or laptop and upload the following code, which transmits the intended message.

```
#include <SoftwareSerial.h> // import the serial library
SoftwareSerial Genotronex(10, 11); // RX, TX

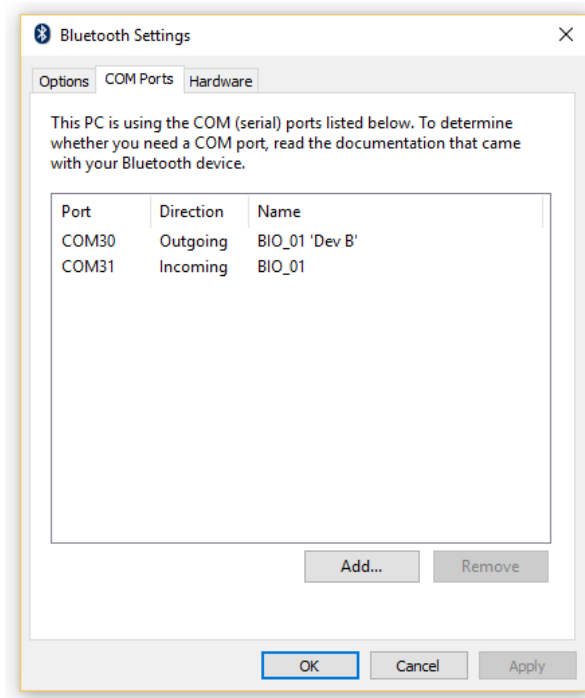
void setup() {
    Genotronex.begin(9600);
}

void loop() {
    Genotronex.println("Hello Biomeasurements lab!");
    delay(100);
}
```

2. Note: You'll need a remote computer (different from the one that you have Arduino connected to) to send the message to. If you don't have a second computer, simply disconnect Arduino from the computer it is connected to, and power it with a 9V battery.

Go to the Bluetooth settings on your remote computer and pair it with the Bluetooth module. The password is the number following “Bio” in the Bluetooth device name. For example, device Bio02 has password: 02 etc.

3. After successfully pairing, go to your Bluetooth Settings and select the ‘COM Ports’ tab. Write down the ‘Outgoing’ port number of your module. (ex. Outgoing port number is ‘COM30’)



4. Open a blank Arduino program on the remote computer and select the port with the same value as the Bluetooth port in step 3 above. (Note: You **DON'T NEED** a second Arduino Board for this step!)
5. Click on the Serial Monitor, set the baud rate to 115200, and you should see the message sent from Arduino via the Bluetooth to your remote computer

## **Activity 2.0 Remotely control an LED connected to the Arduino board from via Bluetooth from a remote computer (60pts.).**

### **Procedure:**

1. Connect an LED to pin D13 on Arduino with a suitable resistor in series to limit the current.
2. Connect the Arduino board to a computer and download the following code:

```
#include <SoftwareSerial.h> // import the serial library
SoftwareSerial Genotronex(10, 11); // RX, TX
int ledpin=13; // led on D13 will show blink on / off
int BluetoothData; // the data given from Computer
```

```
void setup() {  
    Genotronex.begin(9600);  
    Genotronex.println("Bluetooth On please press 1 or 0 blink LED ..");  
    pinMode(ledpin,OUTPUT);  
}  
void loop() {  
    if (Genotronex.available()){  
        BluetoothData=Genotronex.read();  
        if(BluetoothData=='1'){ // if number 1 pressed ....  
            digitalWrite(ledpin,1);  
            Genotronex.println("LED On D13 ON !");  
        }  
        if (BluetoothData=='0'){// if number 0 pressed ....  
            digitalWrite(ledpin,0);  
            Genotronex.println("LED On D13 Off !");  
        }  
    }  
    delay(100);// prepare for next data ...  
}
```

3. Reconnect the 9V supply back to the Arduino board (if this applies to you as before, i.e. you only have one computer).
4. On your remote computer, open a blank Arduino sketch as before. Remember to set the COM port to same value as your Bluetooth. Open the Arduino serial monitor and type "1" followed by the "enter" key (or send button) and observe the LED turn on. Enter, "0" followed by the "enter" key and observe the LED turn off.

END OF LAB

**DISASSEMBLE YOUR CIRCUIT PARTS AND ARRANGE THEM ON THE TABLE  
JUST AS WAS PROVIDED TO YOU, BEFORE LEAVING.**