



Experiment - 9

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Subject: IOT LAB

Aim:

Real Time application of controlling actuators through Bluetooth application using Arduino.

Objective:

1. Learn about controlling actuators through Bluetooth.
2. Learn about IoT programming.

Components Required:

1. 8 Male/Male Jumper Wires
2. 1 HC-05 Bluetooth Module
3. 1 (5 mm) LED: Red
4. 1 Arduino UNO
5. 1 Resistor 1k ohm

Theory:

Arduino:

It is an open-source electronics platform. It consists ATmega328 8-bit Micro controller. It can be able to read inputs from different sensors & we can send instructions to the micro controller in the Arduino. It provides Arduino IDE to write code & connect the hardware devices like Arduino boards & sensors.

LCD:

A Liquid Crystal Display commonly abbreviated as LCD is basically a display unit built using Liquid Crystal technology. When we build real life/real world electronics-based projects, we need a medium/device to display output values and messages. The most basic form of electronic display available is seven segment display, which has its own limitations. The next best available option is Liquid Crystal Displays which comes in different size specifications.

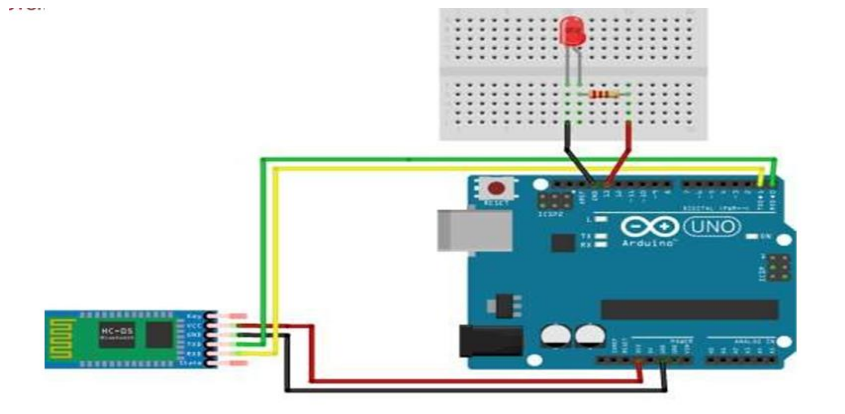
HC-05 Bluetooth Module:

HC-05 is a Bluetooth module which is designed for wireless communication. This module can be used in a master or slave configuration.

HC-05 module has two modes:

- a) Data mode: Exchange of data between devices.
 - b) Command mode: It uses AT commands which are used to change setting of HC-05. To send these commands to module serial (USART) port is used.
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- I. VCC: Connect 5 V or 3.3 V to this Pin.
 - II. GND: Ground Pin of module.
 - III. TXD: Transmit Serial data (wirelessly received data by Bluetooth module transmitted out serially on TXD pin)
 - IV. RXD: Receive data serially (received data will be transmitted wirelessly by Bluetooth module).
 - V. State: It tells whether module is connected or not.

Circuit Diagram:



CODE:

```
#include<SoftwareSerial.h>

SoftwareSerial bluetoothSerial(10, 11);

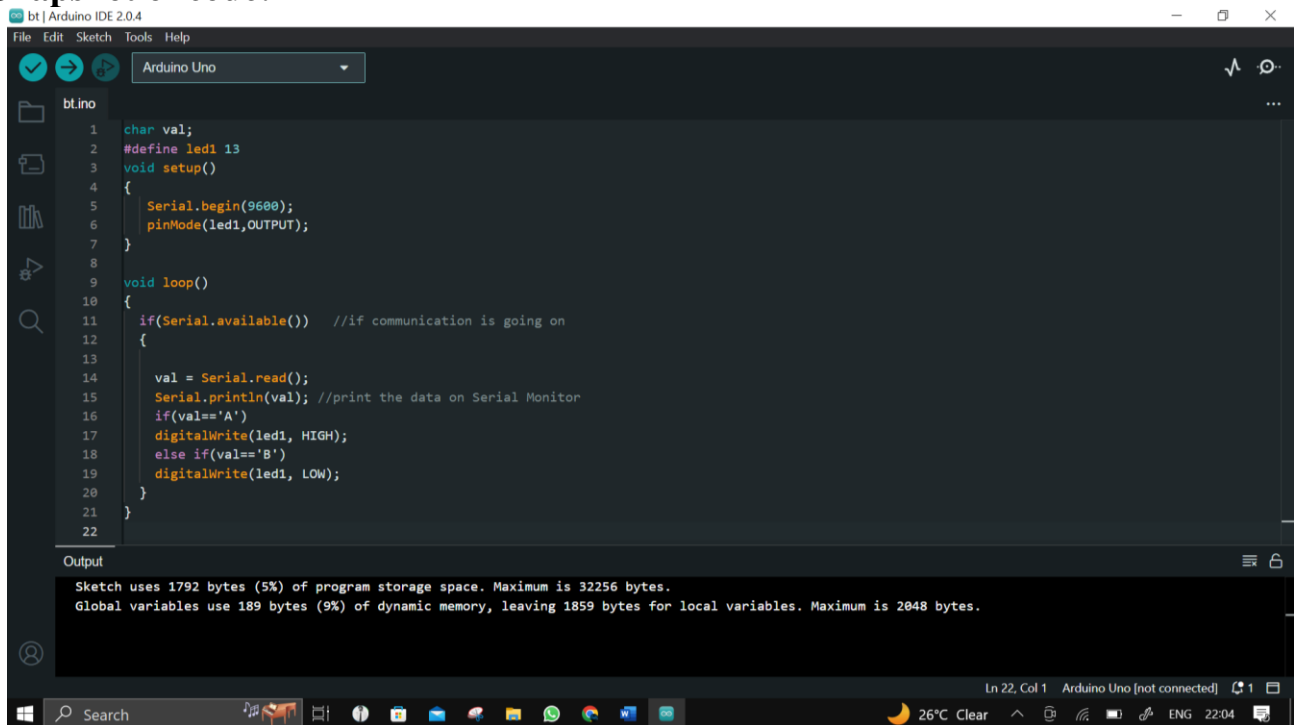
char switchstate;
int LED = 13;

void setup(){
    Serial.begin(9600);
    pinMode(LED,OUTPUT);
}

void loop(){
    while(Serial.available() > 0){
        switchstate = Serial.read();
```

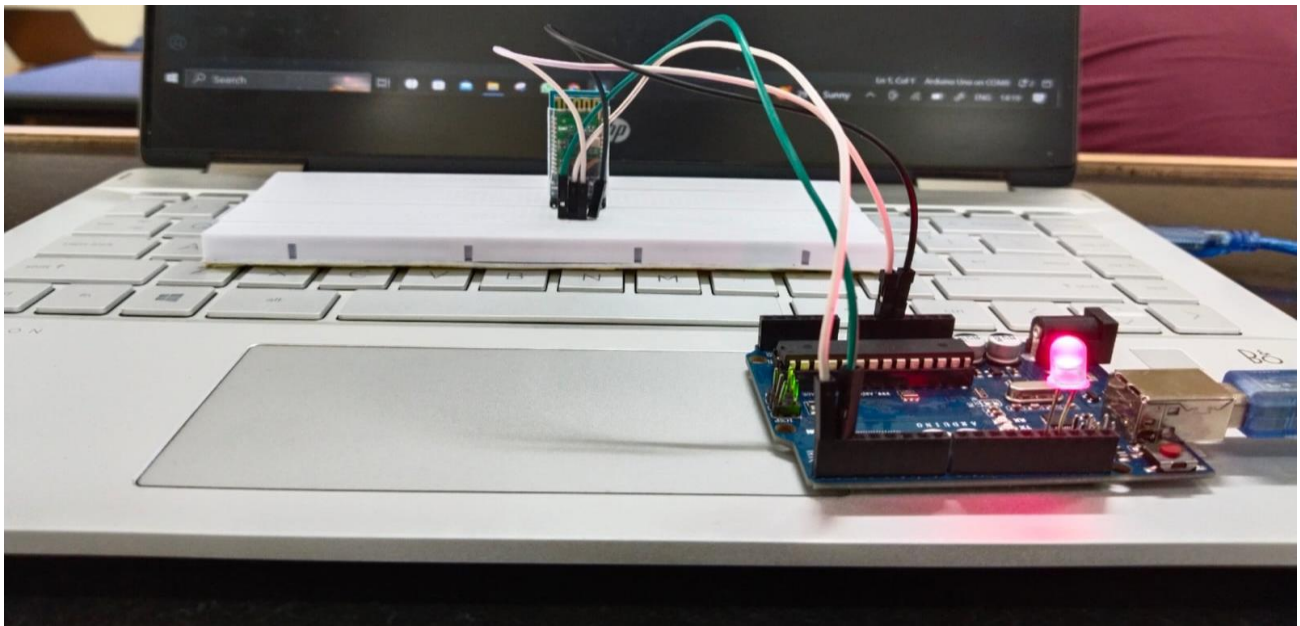
```
if(switchstate == '1'){  
    digitalWrite(13,HIGH);  
}  
else if(switchstate == '0'){  
    digitalWrite(13,LOW);  
}  
  
}  
}
```

Snapshot of code:



```
bt | Arduino IDE 2.0.4  
File Edit Sketch Tools Help  
Arduino Uno  
btino  
1 char val;  
2 #define led1 13  
3 void setup()  
4 {  
5     Serial.begin(9600);  
6     pinMode(led1,OUTPUT);  
7 }  
8  
9 void loop()  
10 {  
11     if(Serial.available()) //if communication is going on  
12     {  
13  
14         val = Serial.read();  
15         Serial.println(val); //print the data on Serial Monitor  
16         if(val=='A')  
17             digitalWrite(led1, HIGH);  
18         else if(val=='B')  
19             digitalWrite(led1, LOW);  
20     }  
21 }  
22  
Output  
Sketch uses 1792 bytes (5%) of program storage space. Maximum is 32256 bytes.  
Global variables use 189 bytes (9%) of dynamic memory, leaving 1859 bytes for local variables. Maximum is 2048 bytes.  
Ln 22, Col 1 Arduino Uno [not connected] 1  
Search 26°C Clear ENG 22:04
```

Output:





Learning Outcomes:

1. Learn about IoT based simulations.
2. Learn about HC-05 Bluetooth Module.
3. Learn about how to control led using Bluetooth module using app