# Khulna University of Engineering & Technology

## Report  on Smart Home Project

**Course No : CSE 3104**

**Course Name: Peripherals and Interfacing Laboratory**

**Project Name: Smart Home Project**

**Project Partners: 1707038, 1707040, 1707060**

**Submitted To**

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## Objective:

**The main objective of this project is to make home users life easier. Using the circuit of this project, home users don't need to go to their main circuit board to ON/OFF their AC appliances like LEDs, TVs, FANs etc. Users can control their ac appliances using Bluetooth software along with this project circuit in any suitable place inside their home.**

## Introduction:

This is a smart home project that will help a home user to control home appliances like LEDs, TV, FANs i.e any AC appliances wirelessly means using software that uses Bluetooth connection to the project circuit.

## Components:

1. 4 channels Relay Module
2. Arduino Uno
3. HC05 Bluetooth Module
4. Bluetooth Software like 'Arduino Bluetooth Controller (4 channel)'
5. AC components like Bulbs
6. Jumper wires
7. Breadboard and Arduino Program.

## Connection Steps:

1. There are 6 pins in the Relay Module: Gnd, Vcc, IN-1, IN-2, IN-3, IN-4
   a. IN-1 for Relay1
   b. IN-2 for Relay2
   c. IN-3 for Relay3
   d. IN-4 for Relay4
2. Connect input pins IN-1/2/3/4 to arduino's pin 2/3/4/5
3. Connect Bluetooth module's TX and RX pins to arduino's pin 10, 12
4. Connect arduino's Gnd and 5v pins to bredboard's Gnd and Vcc
5. Connect Gnd, Vcc of both Relay module and Bluetooth module to bredboard's Gnd and Vcc pin.
6. Each relay har 3 pins: NC, COMMON, NO
7. Connect relays to AC power supply and AC components like the following
   a. Power supply's Positive Terminal + each relay's COMMON pin (by sorting)
   b. Each AC component's Positive Terminal + each relay's NO (Normal Open) pin
   c. Sort all the negative terminals of both Power Supply and AC Components together

# Working Principle:

1. We used an app called "Bluetooth Controller 4CH"
2. First we have to make connection between this APP and Bluetooth Module (HC-05)
3. 6 buttons are there (button 1, 2, 3, 4, ON ALL and OFF ALL) in the app
4. When button-1 is pressed 1$^{st}$ time, character value '1' is passed to Bluetooth module that receives the value by RX pin, whice then send to Arduino through TX pin
5. So according to the program inside Arduino, the AC component connected to Relay-1 will be ON
6. When button 1 is pressed again, charater value 'A' is passed and the AC component connected to Relay-1 will be OFF
7. Similarly for buttons 2,3,4 character values '2', '3', '4' are passed for 1$^{st}$ press and 'B', 'C', 'D' are passed for 2$^{nd}$ press.
8. For button-ON ALL, character value '9' passed and all AC components connected to 4 relays will be ON
9. For button-OF ALL, character value 'I' passed and all AC components connected to 4 relays will be OFF

# Arduino Program (4 channel):

/**

 * Relay IN1 = pin-2 of Arduino

 * Relay IN2 = pin-3 of Arduino

 * Relay IN3 = pin-4 of Arduino

 * Relay IN4 = pin-5 of Arduino

 */

#include<SoftwareSerial.h>

SoftwareSerial mySerial(10, 12);  // Arduino's 10 = TX and 12 = RX pin of Bluetooth Module(HC-05) Model.

```
#define relay1 2

#define relay2 3

#define relay3 4

#define relay4 5


char val;


void setup() {

    // put your setup code here, to run once:


    pinMode(relay1,OUTPUT);

    pinMode(relay2,OUTPUT);

    pinMode(relay3,OUTPUT);

    pinMode(relay4,OUTPUT);


    //Initially, all relays are off, HIGH = OFF, LOW = ON


    digitalWrite(relay1,HIGH);

    digitalWrite(relay2,HIGH);

    digitalWrite(relay3,HIGH);

    digitalWrite(relay4,HIGH);


    mySerial.begin(9600);

    Serial.begin(9600);
```

```arduino
}


void loop() {


    //check data serial from bluetooth android App

    if( mySerial.available() > 0 ) {

      val = mySerial.read();

      Serial.println(val);

    }


    //Relay1 is on

    if( val == '1' ) {

      digitalWrite(relay1,LOW);

    }


    //Relay2 is on

    else if( val == '2' ) {

      digitalWrite(relay2,LOW);

    }


    //Relay3 is on

    else if( val == '3' ) {

      digitalWrite(relay3,LOW);

    }
```

```
//Relay4 is on

else if( val == '4' ) {

  digitalWrite(relay4,LOW);

}


//All relays ON for '9'

else if( val == '9' ) {

  digitalWrite(relay1,LOW);

  digitalWrite(relay2,LOW);

  digitalWrite(relay3,LOW);

  digitalWrite(relay4,LOW);

}


//relay1 is off

else if( val == 'A' ) {

  digitalWrite(relay1,HIGH);

}


//relay2 is off

else if( val == 'B' ) {

  digitalWrite(relay2,HIGH);

}
```

```
    //relay3 is off

    else if( val == 'C' ) {

      digitalWrite(relay3,HIGH);

    }


    //relay4 is off

    else if( val == 'D' ) {

      digitalWrite(relay4,HIGH);

    }


    //all relays off  for 'I'

    else if( val == 'I' ) {

      digitalWrite(relay1,HIGH);

      digitalWrite(relay2,HIGH);

      digitalWrite(relay3,HIGH);

      digitalWrite(relay4,HIGH);

    }

}
```

## Discussion:

So that's how we implemented our project that will definitely make people lives easier, most importantly it will save their time in a great amount. It's easy to understand the circuit board, connection and programming to control the AC components but at the end it's a great

satisfaction when we ON/OFF the AC components using software and Bluetooth connection. Although Bluetooth module, relay module are a little bit expensive but we managed them.


## Conclusion:

We did the project in a simple way. But for larger system/events, this project can be done in smarter way than we did here. We can use relay modules with a great number of relays and Bluetooth circuit that may contain many Bluetooth modules. So it depends on the requirements, budget and the environment. However projects like this one will definitely make people lives much more easier than ever before.