

# HOME AUTOMATION SYSTEM USING ARDUINO AND ANDROID APP

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## **Introduction**

We are living in the 21st century where automation of any form i.e. home or industrial plays an important role in human life. When it comes to industrial automation, the concept is applied to large machines or robots which helps in increasing the efficiency in terms of production, energy and time.

Home automation on the other hand involves automating the household environment. This is possible because of the smartphones and internet that we are widely using. Home automation can be again divided into just controlling the appliances using a smartphone from a remote location and another type filled with sensors and actuators which controls the lighting, temperature, door locks, electronic gadgets, electrical appliances etc. using a "Smart" system.

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## **Objective**

**In this project, we will design a simple home automation project using simple components using which different electrical appliances can be switched on or off. The project is based on Arduino and we have used Arduino UNO for the project.**

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## **Components Required**

- Arduino UNO with USB Cable
  - Bluetooth Module HC-05
  - 4-Channel Relay Module
  - Jumper Wires
  - Smartphone or Tablet (Bluetooth Enabled)
  - Bulb
  - Power Source
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in our project ) is set to device 5 by default. Then we are ready to control the loads. When a key is pressed in the smartphone, the Bluetooth module receives the corresponding data and internally transmits that data to Arduino.

For Example: When we press 'ON' against device 5 in the app, the data received by the Bluetooth module is '5' and 'ON'. This data is transmitted to Arduino. Arduino then compares the received data with the data written in the sketch and accordingly turns on the device 5. The similar action can be applicable to other keys and loads

Using this type of connection, we can control i.e. turn on or off different home electrical appliances using our smartphones.

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## Code Analysis

### Defining the Arduino's Digital Pins

```
1  /*
2  |
3  */
4  String inputs;
5  #define relay1 2 //Connect relay1 to pin 9
6  #define relay2 3 //Connect relay2 to pin 8
7  #define relay3 4 //Connect relay3 to pin 7
8  #define relay4 5 //Connect relay4 to pin 6
9  #define relay5 6 //Connect relay5 to pin 5
10 #define relay6 7 //Connect relay6 to pin 4
11 #define relay7 8 //Connect relay7 to pin 3
12 #define relay8 9 //Connect relay8 to pin 2
13 void setup()
14 {
15   Serial.begin(9600); //Set rate for communicating with phone
16   pinMode(relay1, OUTPUT); //Set relay1 as an output
17   pinMode(relay2, OUTPUT); //Set relay2 as an output
18   pinMode(relay3, OUTPUT); //Set relay1 as an output
19   pinMode(relay4, OUTPUT); //Set relay2 as an output
20   pinMode(relay5, OUTPUT); //Set relay1 as an output
21   pinMode(relay6, OUTPUT); //Set relay2 as an output
22   pinMode(relay7, OUTPUT); //Set relay1 as an output
23   pinMode(relay8, OUTPUT); //Set relay2 as an output
24   digitalWrite(relay1, LOW); //Switch relay1 off
25   digitalWrite(relay2, LOW); //Switch relay2 off
26   digitalWrite(relay3, LOW); //Switch relay1 off
27   digitalWrite(relay4, LOW); //Switch relay2 off
28   digitalWrite(relay5, LOW); //Switch relay1 off
29   digitalWrite(relay6, LOW); //Switch relay2 off
30   digitalWrite(relay7, LOW); //Switch relay1 off
31   digitalWrite(relay8, LOW); //Switch relay2 off
32 }
```

## Receiving data from the Bluetooth module and perform actions accordingly

```
33
34
35 void loop()
36 {
37   while(Serial.available()) //Check if there are available bytes to read
38   {
39     delay(10); //Delay to make it stable
40     char c = Serial.read(); //Conduct a serial read
41     if (c == '#'){
42       break; //Stop the loop once # is detected after a word
43     }
44     inputs += c; //Means inputs = inputs + c
45   }
46   if (inputs.length() >0)
47   {
48     Serial.println(inputs);
49
```

```
50   if(inputs == "A")
51   {
52     digitalWrite(relay1, LOW);
53   }
54   else if(inputs == "a")
55   {
56     digitalWrite(relay1, HIGH);
57   }
58   else if(inputs == "B")
59   {
60     digitalWrite(relay2, LOW);
61   }
62   else if(inputs == "b")
63   {
64     digitalWrite(relay2, HIGH);
65   }
66   else if(inputs == "C")
67   {
68     digitalWrite(relay3, LOW);
69   }
70   else if(inputs == "c")
71   {
72     digitalWrite(relay3, HIGH);
73   }
74   else if(inputs == "D")
75   {
76     digitalWrite(relay4, LOW);
77   }
78   else if(inputs == "d")
79   {
80     digitalWrite(relay4, HIGH);
81   }
```

```
81 }
82 else if(inputs == "E")
83 {
84   digitalWrite(relay5, LOW);
85 }
86 else if(inputs == "e")
87 {
88   digitalWrite(relay5, HIGH);
89 }
90 else if(inputs == "F")
91 {
92   digitalWrite(relay6, LOW);
93 }
94 else if(inputs == "f")
95 {
96   digitalWrite(relay6, HIGH);
97 }
98 else if(inputs == "G")
99 {
100   digitalWrite(relay7, LOW);
101 }
102 else if(inputs == "g")
103 {
104   digitalWrite(relay7, HIGH);
105 }
106 else if(inputs == "H")
107 {
108   digitalWrite(relay8, LOW);
109 }
110 else if(inputs == "h")
111 {
112   digitalWrite(relay8, HIGH);
113 }
114 inputs="";
115 }
116 }
```

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## **Applications and Future Aspects**

- Using this project, we can turn on or off appliances remotely i.e. using a phone or tablet.
  - The project can be further expanded to a smart home automation system by including some sensors like light sensors, temperature sensors, safety sensors etc. and automatically adjust different parameters like room lighting, air conditioning (room temperature), door locks etc. and transmit the information to our phone.
  - Additionally, we can connect to internet and control the home from remote location over internet and also monitor the safety
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## **Conclusion**

The project proves efficient in providing remote accessibility of home lights to users through their cell as long as there is enough power supply availability. This can be further levelled up to the entire home automation system by widening the scope of appliances considered under this project. It is also cost effective and hence a good fortune for its marketing.

### **Project Video Demonstration Link :**

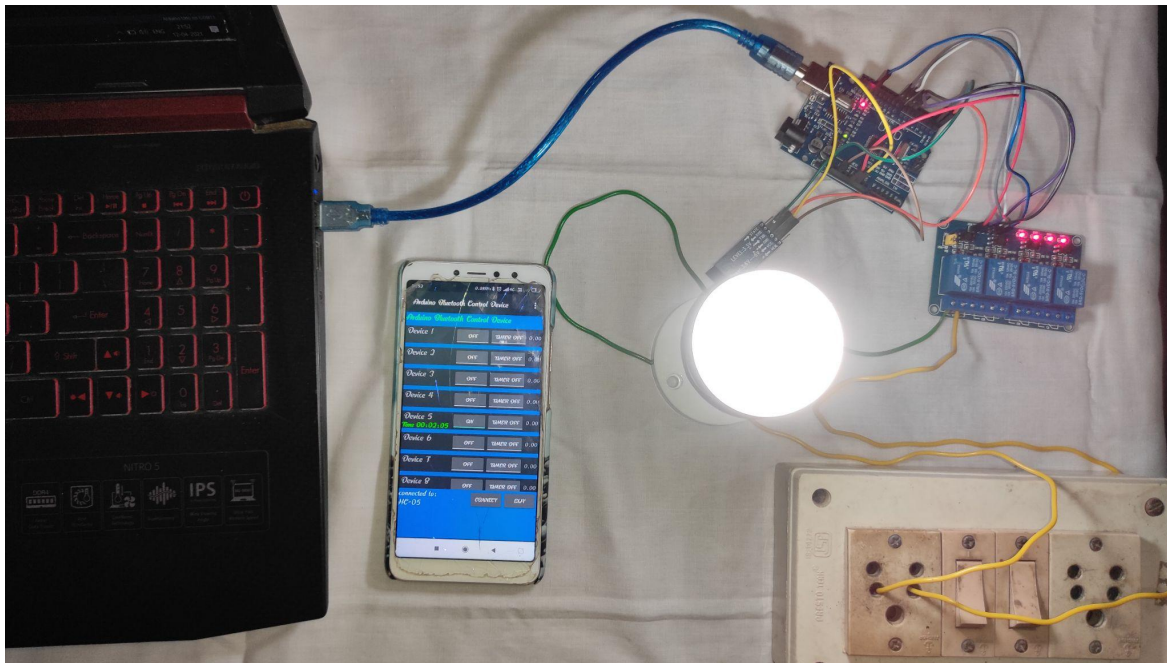
[https://drive.google.com/file/d/1TefK4WRecAMHtB6\\_cqR5kN8Zn2g3kX1B/view?usp=sharing](https://drive.google.com/file/d/1TefK4WRecAMHtB6_cqR5kN8Zn2g3kX1B/view?usp=sharing)

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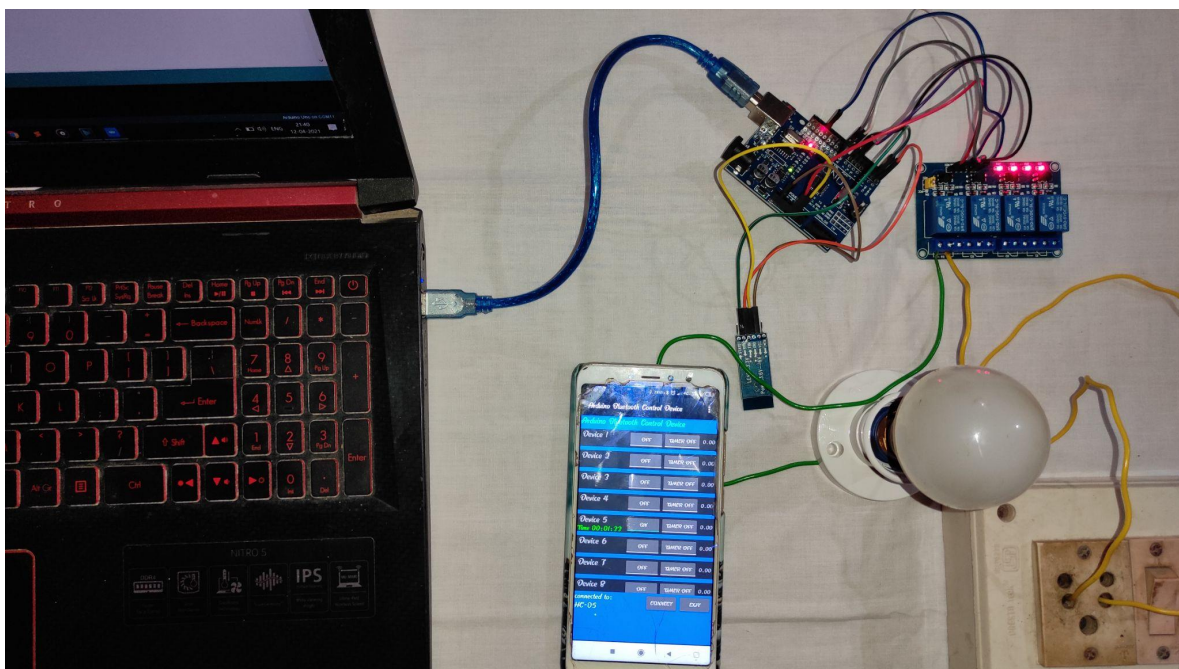
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## Project Images



**SWITCH ON MODE**



**SWITCH OFF MODE**

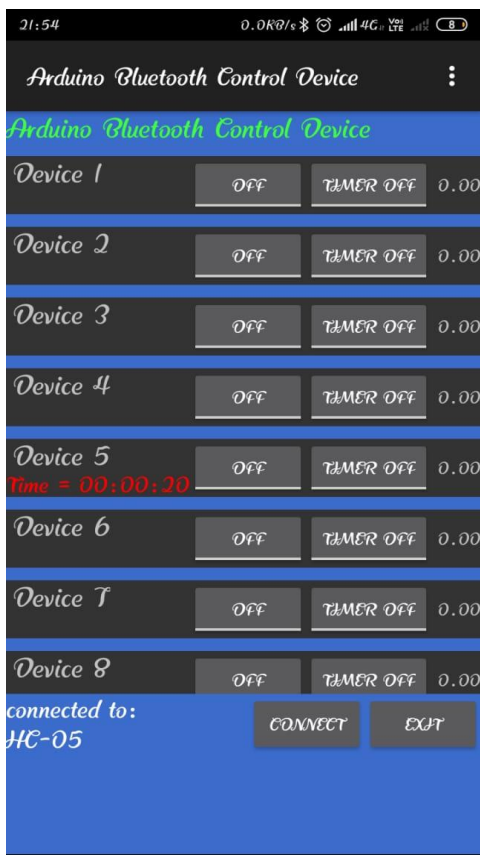




# Screenshots of the Android App in On and Off Mode



SWITCH ON MODE



SWITCH OFF MODE

## **References**

- <https://www.arduino.cc/en/main/documentation>
- <https://randomnerdtutorials.com/guide-for-relay-module-with-arduino>
- [https://bulebots.readthedocs.io/en/latest/hc05\\_bluetooth.html](https://bulebots.readthedocs.io/en/latest/hc05_bluetooth.html)
- <https://www.instructables.com/>
- <https://www.security.org/home-automation/>

**THANK YOU !!!**