



National Institute of Technology

Warangal

Department of Electronics and Communication

MICROPROCESSORS AND MICROCONTROLLERS

MINI PROJECT:

TITLE NAME:

ARDUINO BASED HOME AUTOMATION SYSTEM VIA BLUETOOTH

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CERTIFICATE

THIS IS TO CERTIFY THAT THE UNDERSIGNED STUDENTS OF III/IV
B.Tech,SECTION-B ELECTRONICS AND COMMUNICATION
ENGINEERING BRANCH,HAVE COMPLETED THEIR MINI PROJECT
TITLED “ARDUINO BASED HOME AUTOMATION SYSTEM VIA
BLUETOOTH”,FOR THE PARTIAL FULFILMENT OF
MICROPROCESSORS AND MICROCONTROLLERS LABORATORY.

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ABSTRACT:

Home automation involves automating the house hold environment.

Now-a-days people have smartphones with them all the time. So it makes sense to use these to control home appliances. In this project, we will design a simple home automation project using simple components using which different electrical appliances can switched on or off. The project is based on Arduino and we have used Arduino UNO for the project.

THEORY:

Home automation is building automation for a home, called a **smart home** or **smart house**. A home automation system will control lighting, climate, entertainment systems, and appliances. It may also include home security such as access control and alarm systems. A home automation system typically connects controlled devices to a hub.

The user interface for control of the system uses either wall-mounted terminals, tablet or desktop computers, a mobile phone application, that may also be accessible off-site through the Internet. While there are many competing vendors, there are very few worldwide accepted industry standards and the smart home space is heavily Fragmented. Manufacturers often prevent independent implementations by withholding documentation and by litigation.

Components

The list of components mentioned here are specifically for controlling 4 different loads.

- Arduino UNO
-
- HC – 05 Bluetooth Module
-
- 10 K Ω Resistor
-
- 20 K Ω Resistor
-
- 1 K Ω Resistor
-
- 2N2222 NPN Transistor
-
- 1N4007 Diode
-
- 12 V Relay
-
- Prototyping board (Bread board)
-
- Connecting wires
-
- 12 V Power supply
-
- Smartphone or tablet (Bluetooth enabled)

Component Description:

Arduino UNO:

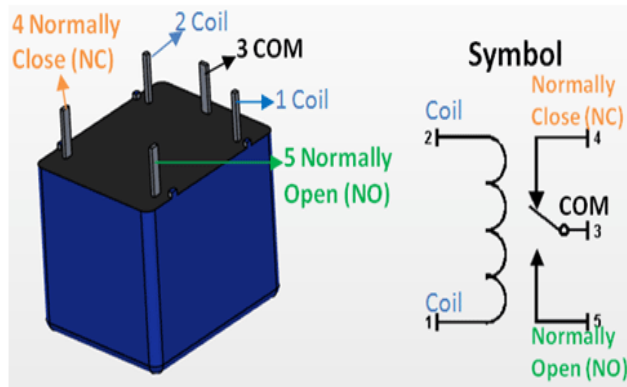
The 8 – bit ATmega 328P microcontroller based Arduino UNO is used in the project to control different components like Bluetooth module and relay network.

Bluetooth Module:

The Bluetooth Module used in this project is HC- 05. This Bluetooth module has 4 – pins for VCC (5V), ground, TX and RX.

This Bluetooth can be used with Bluetooth enabled phone (or tablet or laptop) and the range of this module is approximately 10 meters.

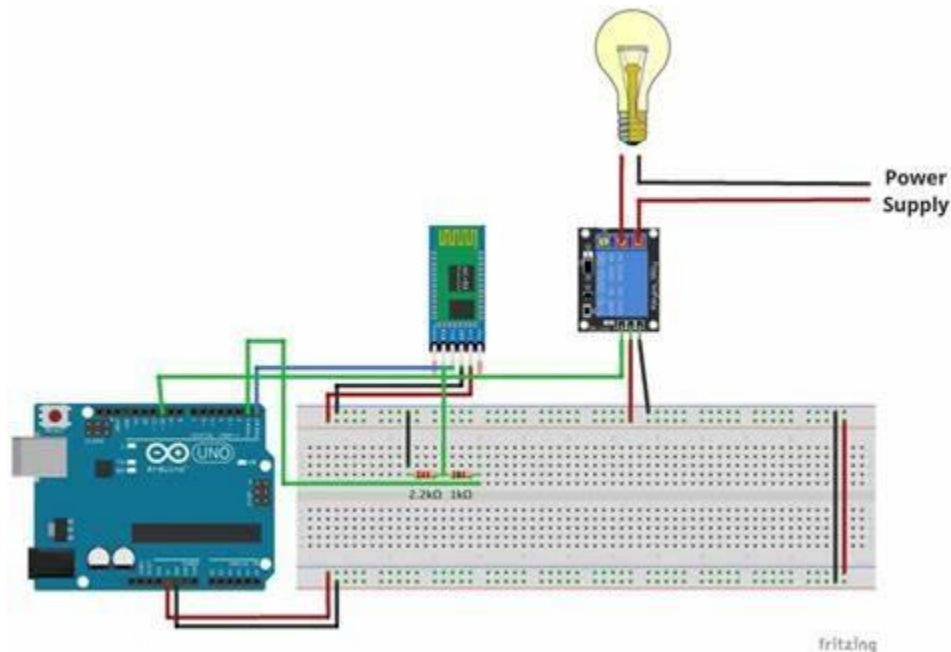
RELAY:



Relays are switches that open and close circuits electromechanically or electronically. Relays control one electrical circuit by opening and closing contacts in another circuit. As relay diagrams show, when a relay contact is normally open (NO), there is an open contact when the relay is not energized. When a relay contact is Normally Closed (NC), there is a closed contact when the relay is not energized. In either case, applying electrical current to the contacts will change their state.

Relays are generally used to switch smaller currents in a control circuit and do not usually control power consuming devices except for small motors and Solenoids that draw low amps. Nonetheless, relays can "control" larger voltages and amperes by having an amplifying effect because a small voltage applied to a relays coil can result in a large voltage being switched by the contacts.

CIRCUIT DIAGRAM:



Working Process:

A simple home automation project using Arduino UNO, Bluetooth module and a smartphone. The aim of this project is to control different home appliances using a smartphone. The working of the project is explained here.

When the power is turned on, the connection LED on the Bluetooth module starts blinking. We need to start the “Bluetooth Lamp Controller” app in our smartphone and get connected to the Bluetooth module. If the pairing is successful, the LED becomes stable.

Then we are ready to control the loads. When a key is pressed in the smartphone, the Bluetooth module receives the corresponding data and intern transmits that data to Arduino.

Now, in the app, we need to set different keys for different loads and their corresponding value that must be transmitted when that key is pressed.

For example, if we press “LOAD 2 ON”, then the data received by the Bluetooth module is “2”.

This data i.e. “2” is transmitted to Arduino. Arduino then compares the received data with the data written in the sketch and accordingly turns on the load 2. 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.

CODE:

```
#include<SoftwareSerial.h>

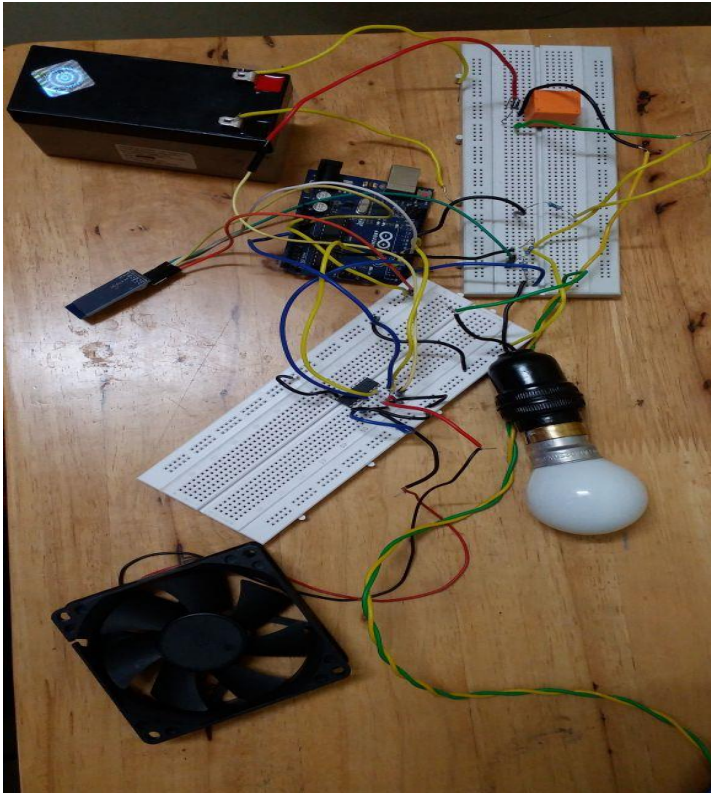
void setup() {
    // put your setup code here, to run once:
    Serial.begin(9600);
    pinMode(9,OUTPUT);
    pinMode(11,OUTPUT);
}

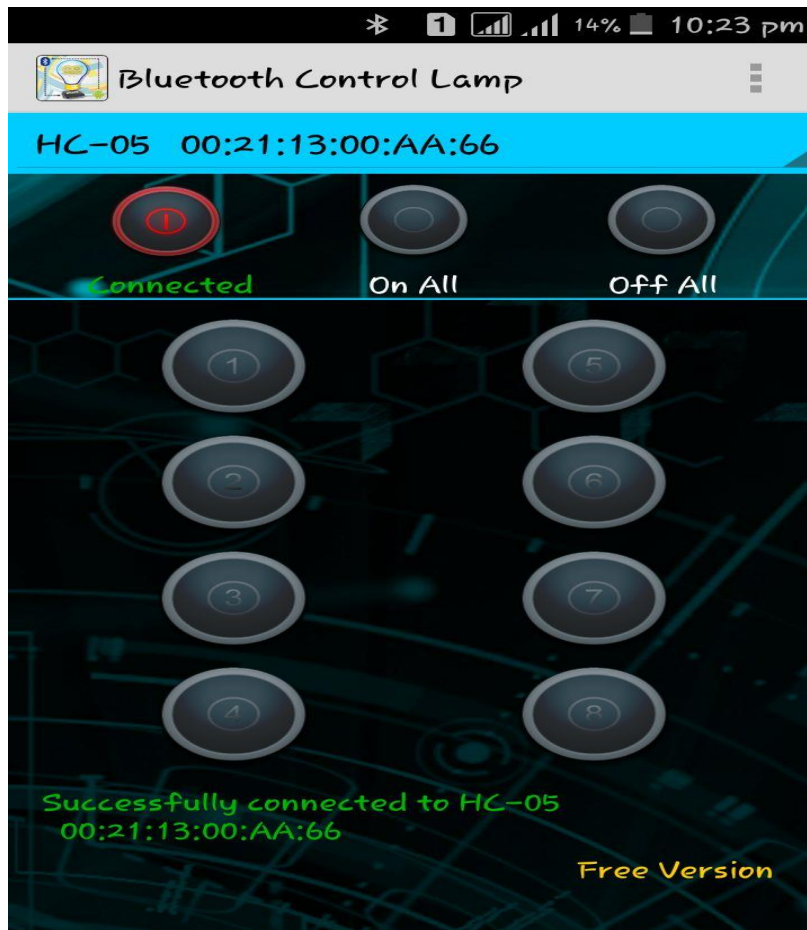
void loop() {
    // put your main code here, to run repeatedly:
    if(Serial.available()>0){
        int data=Serial.read();
        switch(data){
            case '1':digitalWrite(9,HIGH);break;
            case '2':digitalWrite(11,LOW);break;
            default : digitalWrite(9,LOW);
                    digitalWrite(11,HIGH);
            break;
        }
    }
}
```

```
delay(50);
```

```
}
```

RESULTS:





CONCLUSIONS:

By using the bluetooth lamp controller app, we are able to on and off the Bulb.

The project can be further expanded to a smart home automation 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.

REFERENCES:

1. <https://www.electronicshub.org/arduino-based-home-automation/>
2. D. Chowdhry, R. Paranjape, P. Laforge, "Smart home automation system for intrusion detection", *2015 IEEE 14th Canadian Workshop on Information Theory (CWTT)*, pp. 75-78, 2015.
3. wikipedia.