

Bluetooth Based Home Automation Using Arduino

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Abstract: The main objective of this project is to develop a home automation system using an Arduino board with Bluetooth being remotely controlled by any Android OS smart phone. As technology is advancing so houses are also getting smarter. Modern houses are gradually shifting from conventional switches to centralized control system, involving remote controlled switches. Presently, conventional wall switches located in different parts of the house makes it difficult for the user to go near them to operate. Even more it becomes more difficult for the elderly or physically handicapped people to do so. Remote controlled home automation system provides a most modern solution with smart phones. In order to achieve this, a Bluetooth module is interfaced to the Arduino board at the receiver end while on the transmitter end, a GUI application on the cell phone sends ON/OFF commands to the receiver where loads are connected. By touching the specified location on the GUI, the loads can be turned ON/OFF remotely through this technology.

Keywords: Arduino, Home automation, Bluetooth.

1. Introduction

Now-a-days, we have remote controls for our television sets and other electronic systems, which have made our lives real easy. Have you ever wondered about home automation which would give the facility of controlling tube lights, fans and other electrical appliances at home using a remote control? Of-course, Yes! But, are the available options cost-effective? If the answer is No, we have found a solution to it.

We have come up with a new system called Arduino based home automation using Bluetooth. This system is super-cost effective and can give the user, the ability to control any electronic device without even spending for a remote control. This project helps the user to control all the electronic devices using his/her smart phone. Time is a very valuable thing. Everybody wants to save time as much as they can. New technologies are being introduced to save our time. To save people's time we are introducing Home Automation system using Bluetooth. With the help of this system, you can control your home appliances from your mobile phone. You can turn on/off your home appliances within the range of Bluetooth.

2. Methodology

This project is to lay the basic groundwork for controlling electrical loads using an Arduino controller and a smartphone. A communication medium between the user is provided by the Bluetooth module, through a smartphone such as an Android and the system by giving a voice command to the smartphone.

A person can send commands to the Bluetooth voice control for Arduino's voice the software application installed on the phone i.e., connected via Bluetooth module.

A relay is used to control the home appliances with the Arduino. The relays used in this system are 4 pin relays. The relays are normally in the closed state. For our use-case, we want to turn on the bulb only when we send a signal from a smartphone. That's the reason we connect the load on the NO (Normally Open) terminal, so that when the relay is triggered from the Arduino, the contact brush flicks from NC to NO terminal, thereby completing the circuit to electromagnetic induction. We can do a lot more with home automation, that can be further explored and be used in projects using this as a smaller example of how it can be applied.

Components Used:

- 1) Adapter
- 2) Arduino UNO
- 3) Bluetooth Module HC05
- 4) 2 Channel Relay(5v)
- 5) Jumper Wires

Description:

1) Adapter

A power supply adapter that provides from 7 to 12V (Volts) of DC (Direct Current) is required. The adapter is plugged onto the wall socket and the other end goes directly onto the board's AC socket. Make sure the power adapter complies with your Arduino board specifications.



Fig. 1. Adapter

2) Arduino Uno

The Arduino Uno is a microcontroller board based on the ATmega328P.

It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP header and a reset button.

Simply connect it to a computer with a USB cable or power

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it with an AC-to-DC adapter or battery to get started.

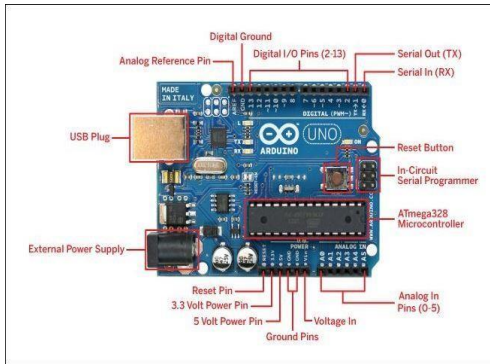


Fig. 2. Arduino Uno

3) Bluetooth Module (HC-05)



Fig. 3. Bluetooth module

For the communication between mobile phone and microcontroller Bluetooth module (HC-05) is used.

HC-05 is low power 1.8V operation and is easy to use with Bluetooth SPP (serial port protocol).

Serial port Bluetooth module have a Bluetooth 2.0+EDR (enhanced data rate), 3Mbps modulation with complete 2.4GHZ radio transceiver and baseband.

Using Bluetooth profile and android platform architecture different type of Bluetooth applications can be developed.

Pin Description:

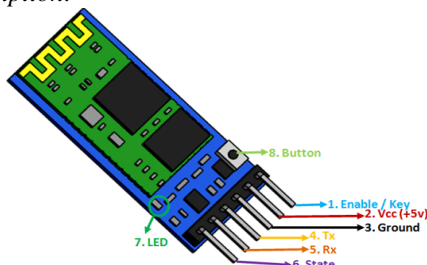


Fig. 4. Pin description

The HC-05 Bluetooth Module has 6pins. They are as follows:
ENABLE:

When enable is pulled LOW, the module is disabled which means the module will not turn

On and it fails to communicate. When enable is left open or connected to 3.3V, the module is

Enabled i.e., the module remains on and communication also takes place.

Vcc:

Supply Voltage 3.3V to 5V

GND:

Ground pin

TXD & RXD:

These two pins acts as an UART interface for communication.

STATE:

It acts as a status indicator. When the module is not connected to paired with any other

Bluetooth device, signal goes Low. At this low state, the led flashes continuously which denotes that the module is not paired with other device. When this module is connected to/paired with any other Bluetooth device, the signal goes

High. At this high state, the led blinks with a constant delay say for example 2s delay which indicates that the module is paired.

Button Switch:

This is used to switch the module into AT command mode. To enable AT command mode, press the button switch for a second. With the help of AT commands, the user can change the

Parameters of this module but only when the module is not paired with any other BT device. If the module is connected to any other Bluetooth device, it starts to communicate with that device and fails to work in AT command mode.

HC-05 Default Settings:

Default Bluetooth Name: HC-05

4) Relay H152S Module

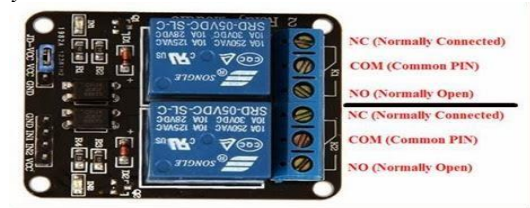


Fig. 5. Relay module

Relay is basically an electromagnetic switch which can be turn on and off by an applying the voltage across its contacts.

A relay accomplishes this by using the 5V outputted from an Arduino pin to energize the electromagnet which in turn closes an internal, physical switch to turn on or off a higher power circuit. The switching contacts of a relay are completely isolated from the coil, and hence from the Arduino.

5) Jumper Wires



Fig. 6. Jumper wires

A jump wire is an electrical wire, or group of them in a cable, with a connector or pin at each end, which is normally used to

interconnect the components of a breadboard or other prototype or test circuit, internally or with other equipment or components, without soldering.

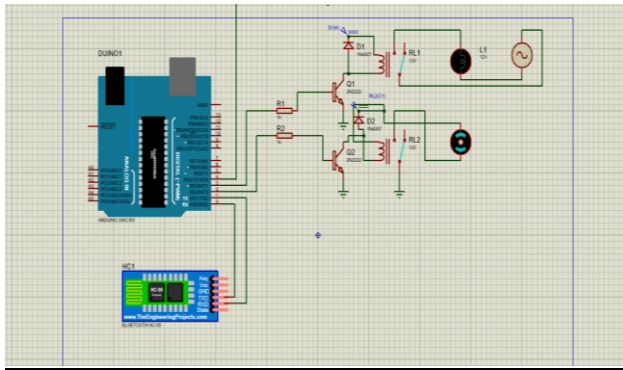


Fig. 7. Layout of automation circuit

Software Architecture:

In this research work two software Arduino Integrated Development Environment (IDE) and Bluetooth terminal application are used.

Arduino IDE:

IDE stands for Integrated Development Environment, entire programming for proposed system is done in Arduino IDE tool. Baud rate is set to 9600 bits per second for serial communication between Arduino board and smartphone. Arduino IDE command "Serial. A variable 0" is used to receive data serially from smartphone and "Serial.println()" command is used to transmit data serially from Arduino board to smartphone. The code to receive data serial from smartphone.

State variable is used to store the value of received byte and then it is compared with different condition and perform the specific operation. The Arduino IDE code for turn ON and OFF Light is shown below.

```
Serial.println(inputs);
if (inputs == 'A') %condition check
{
digitalWrite(relay1,LOW); %Turn OFF the Light
}
else if (inputs == 'a') %condition check
{
digitalWrite(relay1,HIGH); %Turn ON the Light
}
```

3. Conclusion

We concluded that workbench for Schrage motor and dc shunt generator will provide simplicity in power supply and various meters to measures AC and DC quantity. It will consist of AC-DC ammeter, AC-DC voltmeter, 4 pole MCB, indicators.

This workbench will help in connecting motor and load lamp bank to provide connectivity. This workbench also helps them readings of various Electrical parameters and also for safety purpose.

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