

Bluetooth Technology Based Wireless Home Automation System

OBJECTIVE

To create an easy to use small single connection device to connect any device to make it Bluetooth technology enabled for every device to be easily controllable wirelessly.

ABSTRACT

Our project harnesses the power of Bluetooth wireless technology to control everyday objects easily with just a single connection using an HC-05 Bluetooth SPP (Serial Port Protocol) module and an Atmel ATmega328 microcontroller from your phone using an app. You can turn your home appliances on and off with just your phone.

INTRODUCTION

With the uprise of smartphones and low energy Bluetooth technology which is now integrated in every smartphone, we can harness the power of short-wavelength UHF waves for minimal and easy low energy data transfer. Thus bluetooth is ideal for home automation services where we only small amounts are commands needed to be transferred and it consumes very low power. Our device is a single-connection-required device to enable any device you connect it to be controlled wirelessly using an app called blueterm.

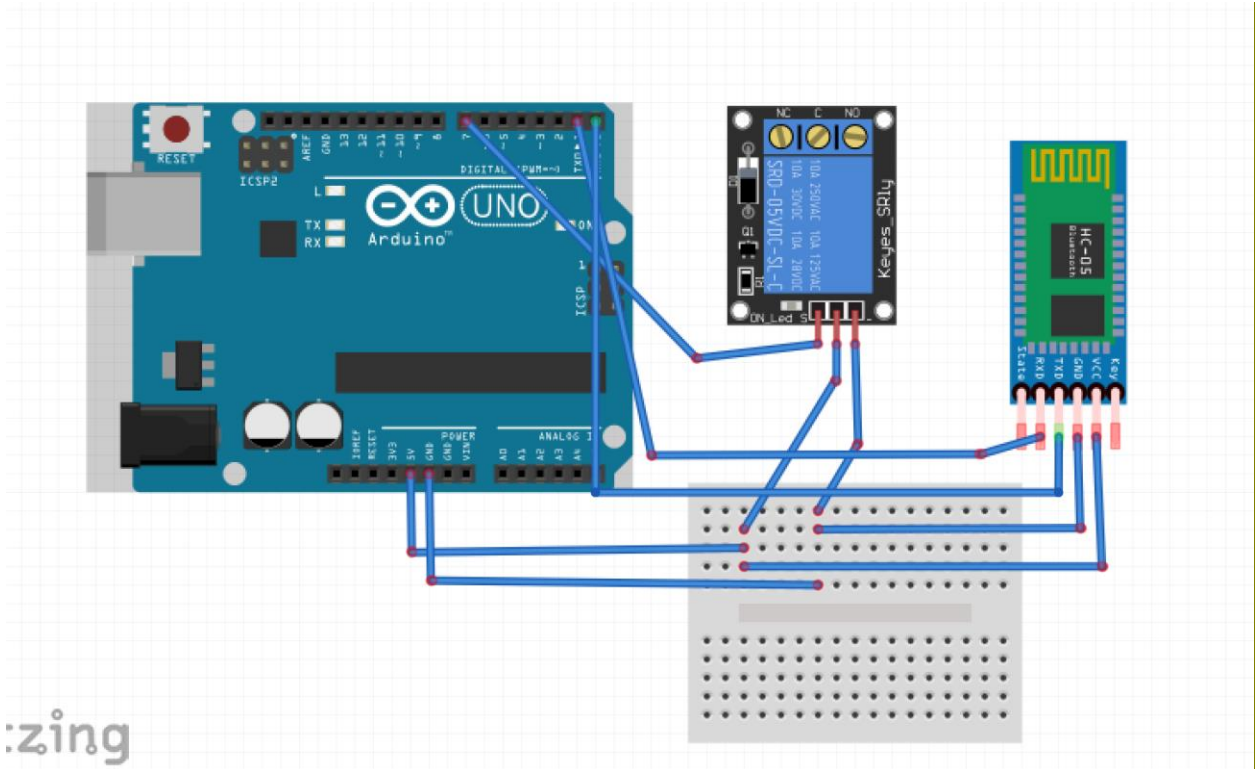
HARDWARE REQUIREMENT/DESCRIPTION

- Atmel ATmega328 microcontroller
- 2-Channel Optocoupler Relay
- HC-05 Bluetooth SPP module
- 9V Battery
- Female Socket
- Male plug

CIRCUIT/COMPONENT SPECIFICATIONS

Operating Voltage	5 V
Input Voltage	7-12 V
DC Current per I/O Pin	20 mA
Bluetooth operating Voltage	1.8 V
Relay Output Voltage	120 V

DIAGRAM



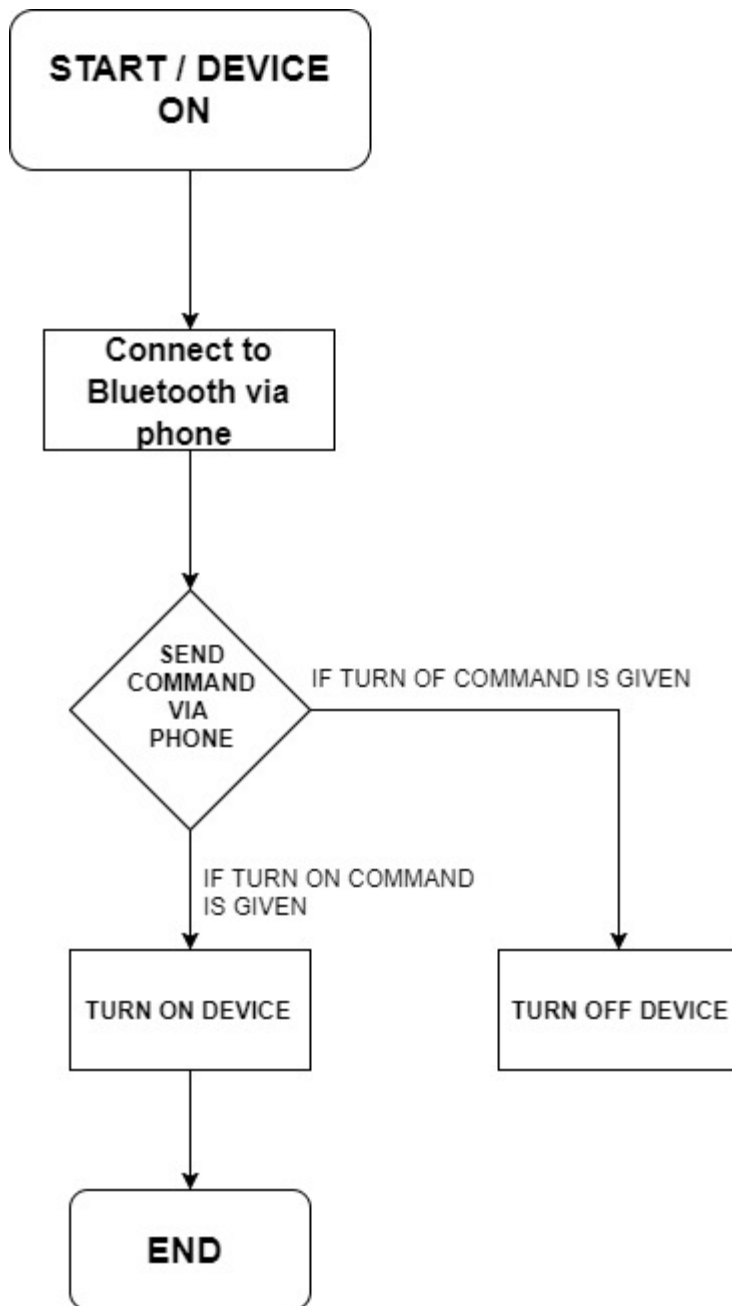
DESIGN ISSUES

The small range of bluetooth technology of just 10 meters can be an issue where the connection can be lost when we are far away from the device.

APPROACH/METHODOLOGY

This device uses an ATmega328p 8 - bit microcontroller to logically control any household device we connect to it using a 2- Channel Optocoupler Relay with is used to control 120 V appliances using our 5v I/O pin from the microcontroller. The microcontroller's TX/RX port is connected to the TX/RX port of the Bluetooth module for the controls to be accessed wirelessly. A 9V battery is connected to the microcontroller to power all the peripherals. The relay works inversely if logic is high the relay is turned off and is the logic is low the relay is turned on.

Serial port Bluetooth module is fully qualified Bluetooth V2.0+EDR (Enhanced Data Rate) 3Mbps Modulation with complete 2.4GHz radio transceiver and baseband.e and acknowledgments) is 2.1 Mbit/s.^[49] EDR uses a combination of [GFSK](#) and [Phase Shift Keying](#) modulation (PSK) with two variants, $\pi/4$ -[DQPSK](#), and 8 [DPSK](#). EDR can provide a lower power consumption through a reduced [duty cycle](#). The specification is published as *Bluetooth v2.0 + EDR*, which implies that EDR is an optional feature. Aside from EDR, the v2.0 specification contains other minor improvements, and products may claim compliance with "Bluetooth v2.0" without supporting the higher data rate. At least one commercial device states "Bluetooth v2.0 without EDR" on its data sheet.



CONCLUSIONS

Our device's first prototype has been designed and constructed. It is ready for use. We can further develop this project to include IoT features.

REFERENCES

[1] Arduino Organization
<https://store.arduino.cc/usa/arduino-uno-rev3>

[2] How to Mechatronics

<http://howtomechatronics.com/tutorials/arduino/control-high-voltage-devices-arduino-relay-tutor>

[3] [https://www.itead.cc/wiki/Serial_Port_Bluetooth_Module_\(Master/Slave\)_:_HC-05](https://www.itead.cc/wiki/Serial_Port_Bluetooth_Module_(Master/Slave)_:_HC-05)

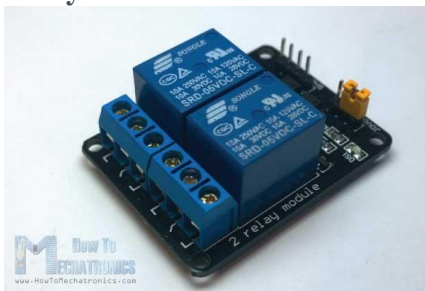
APPENDIX

Arduino Uno (ATmega328p)



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.

Relay



HL-52S 2 channel relay module, which has 2 relays with a rating of 10A @ 250 and 125 VAC and 10A @ 30 and 28 V DC. This is a 5V 2-Channel Relay interface board, Be able to control various appliances and other equipment with large current. A relay can be used to control high voltages with a low voltage by connecting it to an MCU. The 2 relays on the module are independent of each other, once a relay is triggered by the low level, the corresponding LED lights will be lit and accompanied by a crisp sound.

Bluetooth Module



HC-05 module is an easy to use Bluetooth SPP (Serial Port Protocol) module, designed for transparent wireless serial connection setup.

CODE

```
char modedata;
int relay = 7;
void setup() {
  pinMode(relay,OUTPUT);
  Serial.begin(9600);
}

void loop() {
  modedata = Serial.read(); //Read byte of data
  //Turn Relay on
  if (modedata == '1')
  {
    digitalWrite(relay,LOW);
    Serial.println("Device ON");
  }
  //Turn Lamp off
  else if (modedata == '0')
  {
    digitalWrite(relay, HIGH);
    Serial.println("Device OFF");
  }
}
```