Arduino with Single Relays

By: Matthew Jourden
Brighton High School
Brighton, MI

Relays: Arduinos only allow for 5 volts to be passed to a circuit, which does not allow a user to run very many peripherals; a relay connects a secondary power source to a controller (i.e. Arduino) to connect the peripheral devices. The relay receives a High/Low signal from a micro-controller to open the circuit to a the secondary power source. NOTE: it is important to know how much voltage the relay can handle. It is typically written on the relay box.

Arduino

Peripherals
(i.e. Servo, DC Motors, Lights, Sensors, etc.)

Relay has two groups of pins Low Voltage Group (Controller) and High Voltage Group (Peripherals)

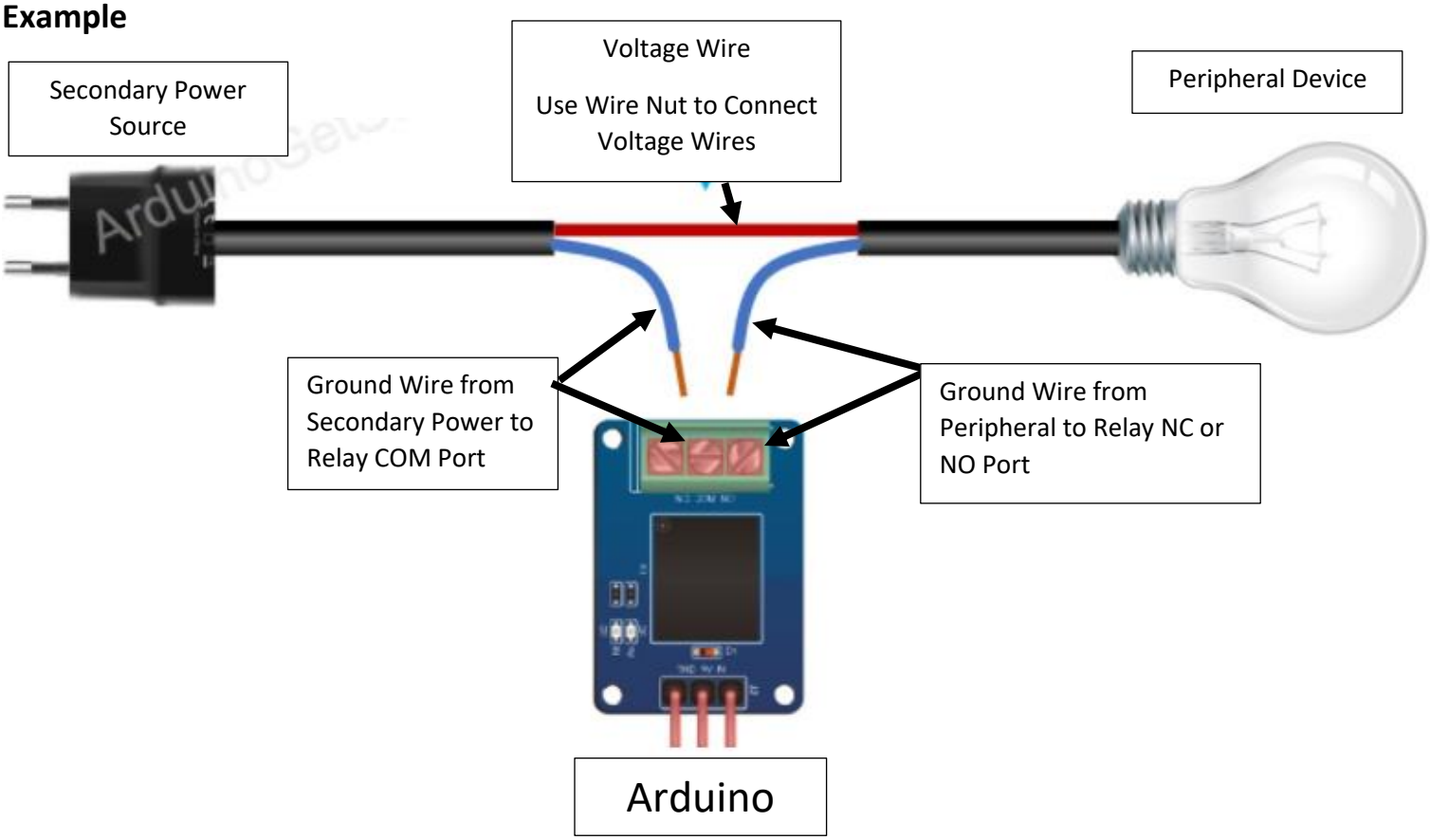
Low Voltage Group

1. GND or DC-: Ground Wire on Arduino
2. VCC or DC+: Connect to 5V Pin on Arduino
3. IN: Receives control signal from Arduino

High Voltage Group

1. COM: is the Common Pin used in both normally open or closed mode (Typically Ground Wire from Peripheral Device)
2. NO: Normally Open (Starts in the Closed (OFF) State (Low) moves to the Open (ON) State)
3. NC: Normally Closed (Starts in the Open (ON) State (Low) moves to the Closed (OFF) State)

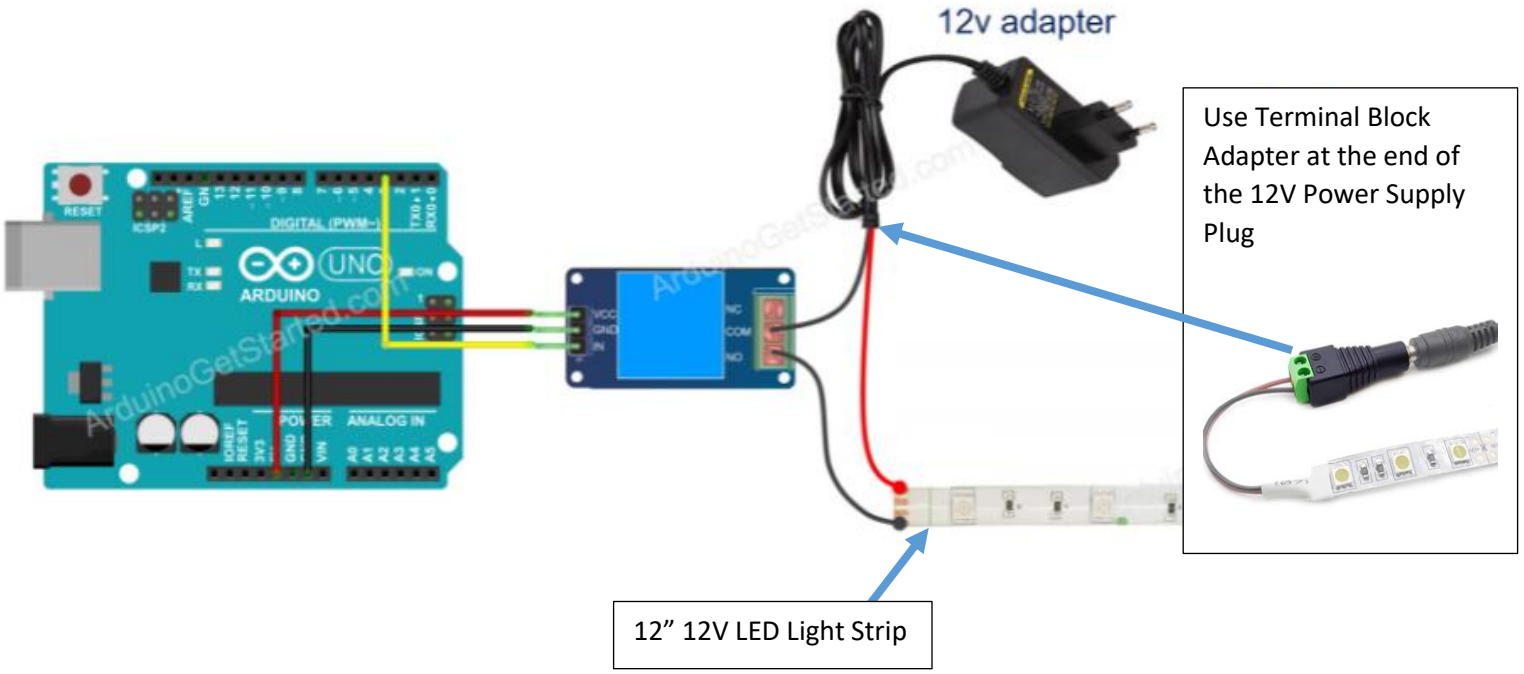
Example



Program: Single Relay Controller with Light Bulb

Objective: Wire a 12 volt LED light strip that is controlled on/off by the Arduino Board

Wire the Following Circuit



Write the Following Program

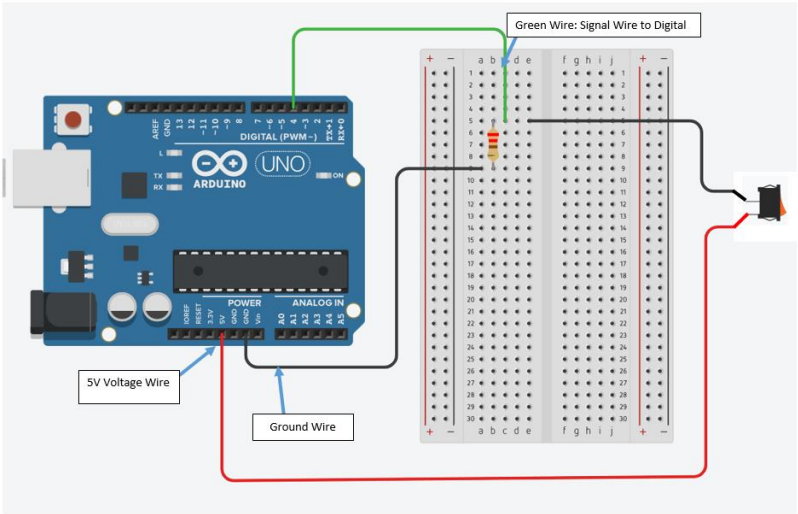
```
int RELAY_PIN = 3;  // the Arduino pin, which connects to the IN pin of relay

void setup() {
  // initialize digital pin as an output.
  pinMode(RELAY_PIN, OUTPUT);
}

// the loop function runs over and over again forever
void loop() {
  digitalWrite(RELAY_PIN, HIGH);       //Turns Relay ON then turns LED Light Strip ON
  delay(3000);
  digitalWrite(RELAY_PIN, LOW);        //Turns Relay OFF then turns LED Light Strip OFF
  delay(1000);
}
```

Assignment:

1. On the Arduino Wire
    a. A Toggle Switch to turn the relay on/off when pressed
        i. Toggled On: Turn Activate the Code that Turns the Relay On
        ii. Toggled Off: Activates New Code that will turn the Relay Off
    b. Wire a signal RGB LED
        i. Red = LED Light Strip Off
        ii. Green = LED Light Strip On

NOTE: Within the Program there should ALWAYS be a Relay Off Command so the High Voltage Source does not burn out the component and/or leave high live voltage active in the circuit,

Toggle Switch Wiring Diagram



Sample Code for Toggle Switch or Push Button

Program: Turns LED Light On/OFF

```
int ledPin = 13; // choose the pin for the LED
int inPin = 7;   // choose the digital input pin (for a pushbutton)
int val = 0;     // variable for reading the pin status 0 = LOW, 1 =HIGH

void setup() {
  pinMode(ledPin, OUTPUT);  // declare LED as output
  pinMode(inPin, INPUT);    // declare pushbutton as input
}
void loop(){
  val = digitalRead(inPin);  // read input value
  if (val == HIGH) {       // check if the input is HIGH (button released)
    digitalWrite(ledPin, LOW);  // turn LED OFF
  } else {
    digitalWrite(ledPin, HIGH);  // turn LED ON
  }
}
```