

# Traffic Light – Pressure Plate Toggle

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## I. Inventory

### Traffic Light

- |    |                                                                                                         |         |
|----|---------------------------------------------------------------------------------------------------------|---------|
| 1. | Traffic Light                                                                                           | \$75    |
|    | <i>Find at garage sales or online</i>                                                                   |         |
| 2. | Arduino UNO R3 board module with DIP ATmega328P                                                         | \$21.83 |
|    | <a href="http://amzn.com/B008GRTSV6">http://amzn.com/B008GRTSV6</a>                                     |         |
| 3. | SainSmart 4 channel relay module                                                                        | \$8.99  |
|    | <a href="http://amzn.com/B0057OC5O8">http://amzn.com/B0057OC5O8</a>                                     |         |
| 4. | Wall adapter power supply 9V DC 650mA                                                                   | \$5.49  |
|    | <a href="http://amzn.com/B003XZSZWO">http://amzn.com/B003XZSZWO</a>                                     |         |
| 5. | 50pc. Jumper wires (male-female)                                                                        | \$3.47  |
|    | <a href="http://amzn.com/B008MRZSH8">http://amzn.com/B008MRZSH8</a>                                     |         |
| 6. | Power cord                                                                                              | \$11.97 |
|    | <a href="http://www.lowes.com/pd_70371-16503-EC501630">http://www.lowes.com/pd_70371-16503-EC501630</a> |         |

### Pressure Plate

- |    |                                                                                                         |        |
|----|---------------------------------------------------------------------------------------------------------|--------|
| 1. | Cardboard                                                                                               | Free   |
|    | Use pieces from boxes                                                                                   |        |
| 2. | Aluminum foil                                                                                           | \$3.48 |
|    | <i>Walmart or any grocery store</i>                                                                     |        |
| 3. | 18GA Speaker wire (50ft.)                                                                               | \$8.97 |
|    | <a href="http://www.lowes.com/pd_302989-63374-AH1850R">http://www.lowes.com/pd_302989-63374-AH1850R</a> |        |
| 4. | Disconnect clips 22-18AWG (male-female)                                                                 | \$3.28 |
|    | <a href="http://www.lowes.com/pd_100422-12704-770309">http://www.lowes.com/pd_100422-12704-770309</a>   |        |
| 5. | A/C foam replacement filter                                                                             | \$1.98 |
|    | <a href="http://www.lowes.com/pd_78359-1410-F1524">http://www.lowes.com/pd_78359-1410-F1524</a>         |        |

Extras

1. Duct tape
2. Electrical tape
3. Extra wire

Total                      \$69.46 (Traffic light not included)

## II. Project Goal

The goal of this project is to mount a traffic light on the ceiling of the garage in front of the garage door. The traffic light will be used to determine when to stop and park the vehicle when pulling into the garage. Think of it as an advanced “tennis ball hanging from the ceiling.”

The overall function will be that the green traffic light will be lite when the garage is signaled to open. It will stay green until the front tire runs over the pressure plate. When the front tire hits the pressure plate, the traffic light will switch to yellow. This will warn the vehicle to proceed slowly. Once the back tire runs over the pressure plate, the traffic light will switch to red. This will tell the vehicle to stop. At this point, you will put the vehicle in park and get out. The vehicle should be in the perfect spot to be able to maneuver around the vehicle and still be able to close the garage door without it hitting the vehicle.

### III. Pressure Plate

1. Cut the cardboard into 4 equal rectangular pieces.
2. Cut the foam filter the same size as the cut cardboard pieces. I used 2 layers of foam pieces.
3. Cut a rectangular opening in the center of the foam cut piece. Make sure it is a decent size opening.
4. Splice one side of the speaker wire and strip off the plastic covering.
5. Wrap aluminum foil around one of the rectangular cardboard pieces. Do this again for another cardboard piece.
6. Use electrical tape and tape one spliced/stripped speaker wire to one of the aluminum covered pieces of cardboard. Tape the other splice/stripped speaker wire to the other aluminum covered piece of cardboard.
7. Tape the foam filter to both aluminum foil covered cardboard pieces.
8. Tape the last two cardboard pieces to each aluminum foil covered pieces.
9. Mark where the back tire of your vehicle is in the garage. Use Duct tape and tape the pressure plate to the garage floor where the tire would stop.
10. Run the speaker wire along the floor/wall all the way to the traffic light
11. Cut the speaker. Splice/strip the wires. Clip on the male disconnects to the speaker wire ends.



## IV. Traffic Light Control

### Arduino Program

My program is written to turn on the green light upon power up. It stays on green until the pressure plate is pushed. Once pressed, it toggles to yellow. It will stay on yellow until the pressure plate is released and pressed again. Once pressed again, it will toggle to red. Then back to green and continue this loop indefinitely. The buttonflag is used to prevent the light from constantly changing if the pressure plate is held down. It also is initialized to 1 so the light stays on green if the pressure plate is pressed when power is enabled.

```
int red = 12;
int yellow = 11;
int green = 10;
int buttonPin = 8;

void setup() {
  pinMode(red, OUTPUT);
  pinMode(yellow, OUTPUT);
  pinMode(green, OUTPUT);
  pinMode(buttonPin, INPUT);
  digitalWrite(buttonPin, HIGH);
  digitalWrite(green, LOW);
  digitalWrite(yellow, HIGH);
  digitalWrite(red, HIGH);
  delay(1000);
}

int buttonState = 0;
int redflag = 1;
int yellowflag = 1;
int greenflag = 0;
int buttonflag = 1;

void loop() {

  buttonState = digitalRead(buttonPin);

  if (buttonState == LOW && buttonflag == 0){
    if (greenflag == 0){
      digitalWrite(green, HIGH);
      digitalWrite(yellow, LOW);
      digitalWrite(red, HIGH);
      yellowflag=0;
      redflag=1;
      greenflag=1;
      buttonflag = 1;
    }
    else if (yellowflag == 0) {
      digitalWrite(yellow, HIGH);
      digitalWrite(red, LOW);
      digitalWrite(green, HIGH);
      redflag=0;
      yellowflag=1;
      greenflag=1;
      buttonflag = 1;
    }
    else if (redflag == 0) {
      digitalWrite(red, HIGH);
      digitalWrite(green, LOW);
      digitalWrite(yellow, HIGH);
      greenflag = 0;
      yellowflag=1;
      redflag=1;
      buttonflag = 1;
    }
  }
  else if (buttonState == HIGH) {
    buttonflag = 0;
  }
  delay(200);
}
```

## Wiring

I soldered the HOT and NEUTRAL wires to the wall adapter prongs then covered them with rubber covers.



I also took two wires and striped both ends and connected a female disconnect to one of both ends. This will connect to the disconnect that we wired to the pressure plate. The other ends will go into the Arduino. One will go in the GND pin and one will go into pin 8. Here is the wiring diagram:



