

Lab 1 Report

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Introduction

In this lab, we implement a traffic light system that toggles the RED/GREEN LEDs (lights) with a press of a button (in this lab, we use a switch), and we also apply concepts of debouncing and pull-down resistors.

Components Used

- Red LED (Pin 8).
- Green LED (Pin 9).
- Switch (Pin 2).
- 3 Resistors (2 to ground LEDs, 1 Pull-down for the switch).

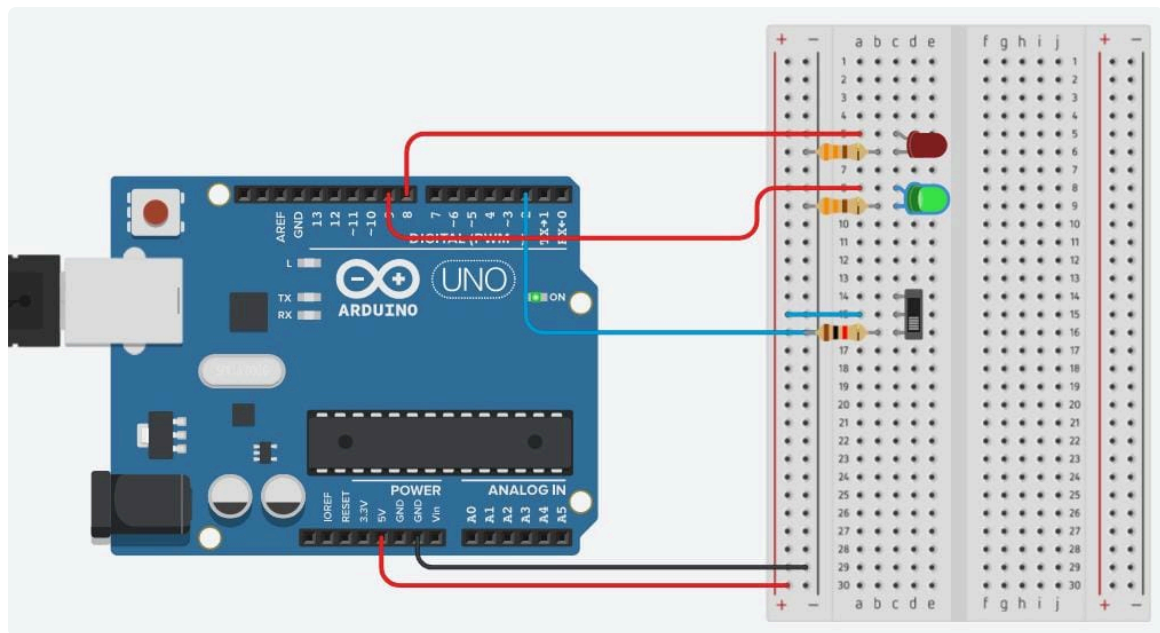
Implementation Details

- The code persists the last previously committed value of the switch.
- When the value of the switch changes, the code first validates the reading using debouncing.
- When the value is committed (read 10 times consistently), the LEDs swap.
- Off → Red LED on, On → Green LED on.

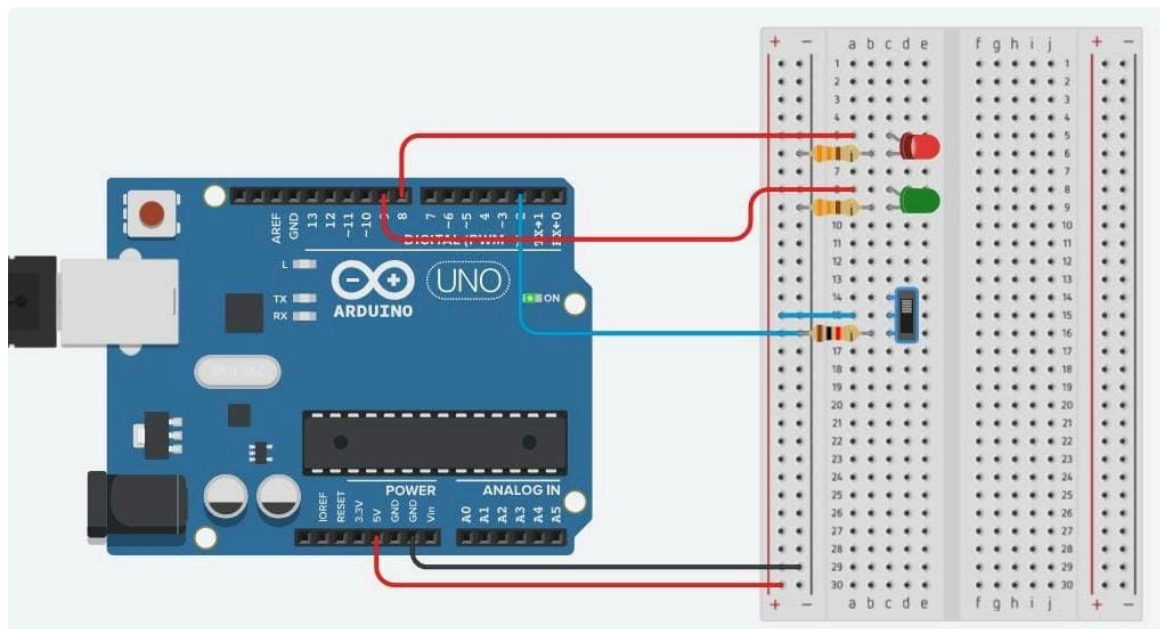
Assumptions

- A switch is used instead of a button.
- Debouncing based on multiple reads (rather than delay-based) is used.

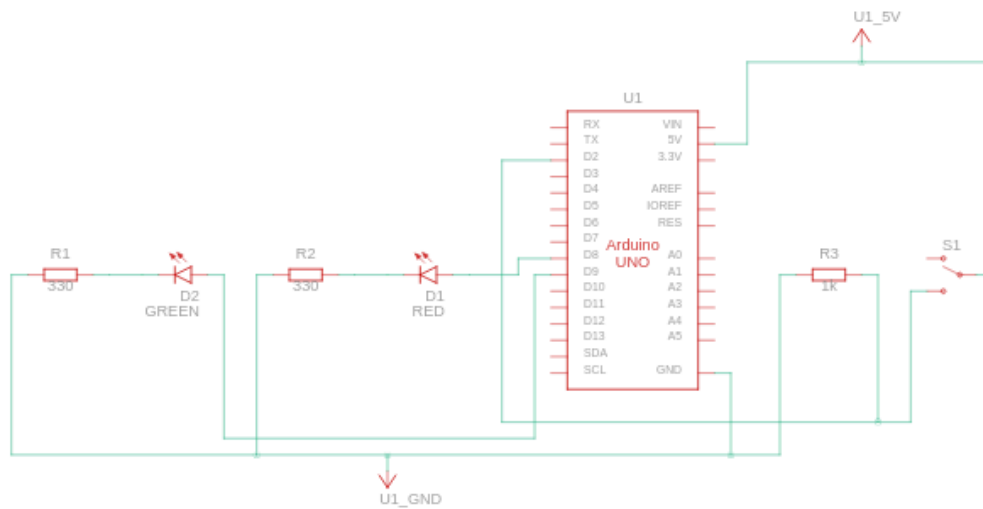
Simulation



Green LED On



Red LED On



Circuit Diagram

Done using TinkerCad

Script

```

1  const int BUTTON_PIN = 2;
2  const int LED1_PIN   = 8;
3  const int LED2_PIN   = 9;
4
5  int ledState = HIGH;
6  int currentButtonState = LOW;
7  int lastButtonReading = LOW;
8
9  void setup() {
10     Serial.begin(9600);
11     pinMode(BUTTON_PIN, INPUT);
12     pinMode(LED1_PIN, OUTPUT);
13     pinMode(LED2_PIN, OUTPUT);
14
15     digitalWrite(LED1_PIN, ledState);
16     digitalWrite(LED2_PIN, !ledState);
17 }
18
19 void loop() {
20     int rawReading = digitalRead(BUTTON_PIN);
21

```

```
22  if (rawReading != currentButtonState) {
23
24      int confidenceCounter = 0;
25      for (int i = 0; i < 10; i++) {
26          if (digitalRead(BUTTON_PIN) == rawReading) {
27              confidenceCounter++;
28          }
29          delay(5);
30      }
31
32      if (confidenceCounter == 10) {
33          currentButtonState = rawReading;
34
35          ledState = !ledState;
36          digitalWrite(LED1_PIN, ledState);
37          digitalWrite(LED2_PIN, !ledState);
38
39          Serial.print("State changed to: ");
40          Serial.println(currentButtonState == HIGH ? "PRESSED" : "RELEASED");
41      }
42  }
43 }
```



Written in Arduino Web Editor