

Arduino Traffic Signal Simulation

1. Introduction

This project simulates a simple traffic light system using an Arduino board. When a button is pressed, three LEDs light up in sequence, representing basic traffic instructions: Stop, Get Ready, and Go.

2. Key Components

- Arduino UNO board
- Push Button
- LED (3 pieces: Red, Yellow, Green)
- Resistors (220 Ω for each LED, 10k Ω for the button)
- Breadboard
- Jumper Wires
- USB Cable (for programming)

3. Working Principle

1. Initialization:

- The three LEDs are connected to digital pins 13, 12, and 8.
- A push button is connected to digital pin 2.
- The Arduino initializes serial communication for monitoring messages.

2. Button Press Detection:

- Arduino continuously reads the state of the push button.
- When the button is pressed (HIGH state), the following sequence happens:

3. LED Control and Messaging:

- **First Phase:**
 - LED on pin 13 lights up.
 - "STOP" message is sent via Serial Monitor.
 - LED stays on for 2 seconds, then turns off.

- **Second Phase:**
 - LED on pin 12 lights up.
 - "GET READY" message is sent.
 - LED stays on for 2 seconds, then turns off.
- **Third Phase:**
 - LED on pin 8 lights up.
 - "BYE" message is sent.
 - LED stays on for 2 seconds, then turns off.

4. Circuit Overview

- **Button:**
 - One terminal to 5V via 10k Ω resistor.
 - Other terminal connected to pin 2 and Ground.
- **LEDs:**
 - Connect Red LED to pin 13 through 220 Ω resistor.
 - Connect Yellow LED to pin 12 through 220 Ω resistor.
 - Connect Green LED to pin 8 through 220 Ω resistor.

5. Code

/*

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*/

/*

This program blinks pin 13 of the arduino (the built-in LED)

*/

```
int buttonState = 0;

const int buttonPin = 2;

int ledOne = 13;

int ledTwo = 12;

int ledThree = 8;


void setup()
{
    pinMode(ledOne, OUTPUT);
    pinMode(ledTwo, OUTPUT);
    pinMode(ledThree, OUTPUT);
    pinMode(buttonPin, INPUT);
    Serial.begin(9600);
}


void loop()
{
    buttonState = digitalRead(buttonPin);
    if(buttonState==1)
    {
        digitalWrite(ledOne, 1);
        Serial.print("STOP\n");
        delay(2000);
        digitalWrite(ledOne, 0);
        delay(500);
    }
}
```

```
digitalWrite(ledTwo, 1);  
Serial.print("GET READY\n");  
delay(2000);  
digitalWrite(ledTwo, 0);  
delay(500);  
digitalWrite(ledThree, 1);  
Serial.print("BYE\n");  
delay(2000);  
digitalWrite(ledThree, 0);  
delay(500);  
}  
}
```

6. Code Explanation

- **Variable Declaration:**
 - buttonState: Stores the reading from the button.
 - buttonPin: Pin connected to the button (pin 2).
 - ledOne, ledTwo, ledThree: Pins connected to the LEDs.
- **setup() Function:**
 - pinMode is used to set the LED pins as OUTPUT and button pin as INPUT.
 - Serial.begin(9600): Starts serial communication at 9600 bps.
- **loop() Function:**
 - Reads the button state.
 - If the button is pressed (HIGH), the following happens sequentially:
 - LED 1 turns on, "STOP" is printed, and LED stays on for 2 seconds.
 - LED 1 turns off, short delay.

- LED 2 turns on, "GET READY" is printed, and LED stays on for 2 seconds.
- LED 2 turns off, short delay.
- LED 3 turns on, "BYE" is printed, and LED stays on for 2 seconds.
- LED 3 turns off, short delay.

7. Conclusion

This Arduino project demonstrates a basic traffic light control system triggered by a button press. It effectively utilizes simple digital I/O operations and serial communication to simulate real-world applications in an understandable and educational way.

