**Traffic Light System**

Select a few LEDs (red, yellow, and green), resistors, and some jumper wires. This project simulates a basic traffic light system.

**Components:**

* Arduino Mega
* Red LED
* Yellow LED
* Green LED
* 3x 220-ohm resistors
* Jumper wires
* Breadboard

**Circuit Setup:**

1. Connect the anode (longer leg) of the Red LED to digital pin 8 on the Arduino Mega through a 220-ohm resistor.
2. Connect the anode of the Yellow LED to digital pin 9 on the Arduino Mega through a 220-ohm resistor.
3. Connect the anode of the Green LED to digital pin 10 on the Arduino Mega through a 220-ohm resistor.
4. Connect all the cathodes (shorter legs) of the LEDs to the ground (GND) on the Arduino Mega.

**TASK 1 TRAFFIC LIGHT SYSTEM ARDUINO CODE**

**// Define LED pins**

**const int redLED = 13;   // Red LED connected to pin 13**

**const int yellowLED = 12; // Yellow LED connected to pin 12**

**const int greenLED = 11;  // Green LED connected to pin 11**

**void setup() {**

**// Set LED pins as output**

**pinMode(redLED, OUTPUT);   // Set red LED as output**

**pinMode(yellowLED, OUTPUT); // Set yellow LED as output**

**pinMode(greenLED, OUTPUT);  // Set green LED as output**

**}**

**void loop() {**

**// Red light ON, others OFF**

**digitalWrite(redLED, HIGH);    // Turn on red LED**

**digitalWrite(yellowLED, LOW);  // Turn off yellow LED**

**digitalWrite(greenLED, LOW);   // Turn off green LED**

**delay(3000); // Wait for 3 seconds**

**// Yellow light ON, others OFF**

**digitalWrite(redLED, LOW);    // Turn off red LED**

**digitalWrite(yellowLED, HIGH); // Turn on yellow LED**

**digitalWrite(greenLED, LOW);   // Turn off green LED**

**delay(5000); // Wait for 5 seconds**

**// Green light ON, others OFF**

**digitalWrite(redLED, LOW);    // Turn off red LED**

**digitalWrite(yellowLED, LOW);  // Turn off yellow LED**

**digitalWrite(greenLED, HIGH);  // Turn on green LED**

**delay(3000); // Wait for 3 seconds**

**// Yellow light ON before switching to red**

**digitalWrite(redLED, LOW);    // Turn off red LED**

**digitalWrite(yellowLED, HIGH); // Turn on yellow LED**

**digitalWrite(greenLED, LOW);   // Turn off green LED**

**delay(2000); // Wait for 2 seconds**

**}**

**TASK 2 TO BLINK ALL THE LIGHTS FOR 3 SECONDS**

**// Blinking all lights for 3 seconds**

**for (int i = 0; i < 6; i++) { // Loop to blink lights 6 times (on/off every 500ms)**

**digitalWrite(redLED, HIGH);**

**digitalWrite(yellowLED, HIGH);**

**digitalWrite(greenLED, HIGH);**

**delay(500); // Wait for 500ms**

**digitalWrite(redLED, LOW);**

**digitalWrite(yellowLED, LOW);**

**digitalWrite(greenLED, LOW);**

**delay(500); // Wait for 500ms**

**}**

**…………………………………………………………………………………**

**COMPLETE CODE**

**// Define LED pins**

**const int redLED = 13;   // Red LED connected to pin 13**

**const int yellowLED = 12; // Yellow LED connected to pin 12**

**const int greenLED = 11;  // Green LED connected to pin 11**

**void setup() {**

**// Set LED pins as output**

**pinMode(redLED, OUTPUT);   // Set red LED as output**

**pinMode(yellowLED, OUTPUT); // Set yellow LED as output**

**pinMode(greenLED, OUTPUT);  // Set green LED as output**

**}**

**void loop() {**

**// Red light ON, others OFF**

**digitalWrite(redLED, HIGH);    // Turn on red LED**

**digitalWrite(yellowLED, LOW);  // Turn off yellow LED**

**digitalWrite(greenLED, LOW);   // Turn off green LED**

**delay(3000); // Wait for 3 seconds**

**// Yellow light ON, others OFF**

**digitalWrite(redLED, LOW);    // Turn off red LED**

**digitalWrite(yellowLED, HIGH); // Turn on yellow LED**

**digitalWrite(greenLED, LOW);   // Turn off green LED**

**delay(5000); // Wait for 5 seconds**

**// Green light ON, others OFF**

**digitalWrite(redLED, LOW);    // Turn off red LED**

**digitalWrite(yellowLED, LOW);  // Turn off yellow LED**

**digitalWrite(greenLED, HIGH);  // Turn on green LED**

**delay(3000); // Wait for 3 seconds**

**// Yellow light ON before switching to red**

**digitalWrite(redLED, LOW);    // Turn off red LED**

**digitalWrite(yellowLED, HIGH); // Turn on yellow LED**

**digitalWrite(greenLED, LOW);   // Turn off green LED**

**delay(2000); // Wait for 2 seconds**

**// Blinking all lights for 3 seconds**

**for (int i = 0; i < 6; i++) { // Loop to blink lights 6 times (on/off every 500ms)**

**digitalWrite(redLED, HIGH);**

**digitalWrite(yellowLED, HIGH);**

**digitalWrite(greenLED, HIGH);**

**delay(500); // Wait for 500ms**

**digitalWrite(redLED, LOW);**

**digitalWrite(yellowLED, LOW);**

**digitalWrite(greenLED, LOW);**

**delay(500); // Wait for 500ms**

**}**

**}**

**TASK 3 CONTROL LIGHT USING SMARTPHONE (BLUETOOTH)**

**Wiring Connections:**

1. **Power Supply:**
   * **Connect the VCC pin of the HC-05 to the 5V pin on the Arduino.**
   * **Connect the GND pin of the HC-05 to the GND pin on the Arduino.**
2. **Communication Pins:**

* **Connect the TXD pin of the HC-05 to the RX pin (pin 0) on the Arduino.**
* **Connect the RXD pin of the HC-05 to the TX pin (pin 1) on the Arduino.**

**CODE**

// Define LED pins

const int redLED = 13; // Red LED connected to pin 13

const int yellowLED = 12; // Yellow LED connected to pin 12

const int greenLED = 11; // Green LED connected to pin 11

const int bluetoothRX = 2; // Bluetooth module RX pin connected to Arduino pin 2

const int bluetoothTX = 3; // Bluetooth module TX pin connected to Arduino pin 3

#include <SoftwareSerial.h>

SoftwareSerial bluetooth(bluetoothRX, bluetoothTX); // Create a software serial port for Bluetooth

void setup() {

// Set LED pins as output

pinMode(redLED, OUTPUT); // Set red LED as output

pinMode(yellowLED, OUTPUT); // Set yellow LED as output

pinMode(greenLED, OUTPUT); // Set green LED as output

bluetooth.begin(9600); // Start Bluetooth communication at 9600 baud rate

}

void loop() {

if (bluetooth.available()) { // Check if data is received from Bluetooth

char command = bluetooth.read(); // Read the received character

if (command == '1') { // If '1' is received, turn ON all LEDs

digitalWrite(redLED, HIGH);

digitalWrite(yellowLED, HIGH);

digitalWrite(greenLED, HIGH);

} else if (command == '0') { // If '0' is received, turn OFF all LEDs

digitalWrite(redLED, LOW);

digitalWrite(yellowLED, LOW);

digitalWrite(greenLED, LOW);

}

}

}

**TASK 4: TO DISPLAY LED LIGHTS ON THE LCD SCREEN**

**Wiring Setup:**

1. **Power Supply:**
   * Connect the **VCC** pin of the LCD to the **5V** pin on the Arduino.
   * Connect the **GND** pin of the LCD to the **GND** pin on the Arduino.
2. **LCD Pins:**
   * **RS (Register Select)** to Arduino pin 7
   * **EN (Enable)** to Arduino pin 8
   * **D4** to Arduino pin 5
   * **D5** to Arduino pin 4
   * **D6** to Arduino pin 3
   * **D7** to Arduino pin 2
   * **V0** (Contrast) to the middle pin of the potentiometer (connect the other two pins of the potentiometer to **5V** and **GND**)

**CODE:**

#include <LiquidCrystal.h> // Include the LiquidCrystal library for LCD

// Define LED pins

const int redLED = 13; // Red LED connected to pin 13

const int yellowLED = 12; // Yellow LED connected to pin 12

const int greenLED = 11; // Green LED connected to pin 11

// Initialize the library with the numbers of the interface pins

LiquidCrystal lcd(7, 8, 5, 4, 3, 2); // RS, EN, D4, D5, D6, D7

void setup() {

// Set LED pins as output

pinMode(redLED, OUTPUT); // Set red LED as output

pinMode(yellowLED, OUTPUT); // Set yellow LED as output

pinMode(greenLED, OUTPUT); // Set green LED as output

// Initialize the LCD and set up the number of columns and rows

lcd.begin(16, 2); // Set up the LCD's number of columns and rows

// Print a message to the LCD

lcd.print("LED Status:"); // Print initial message to the LCD

}

void loop() {

// Red light ON, others OFF

digitalWrite(redLED, HIGH); // Turn on red LED

digitalWrite(yellowLED, LOW); // Turn off yellow LED

digitalWrite(greenLED, LOW); // Turn off green LED

// Update LCD with LED status

lcd.setCursor(0, 1); // Move cursor to the second row

lcd.print("Red LED ON "); // Print status to the LCD

delay(3000); // Wait for 3 seconds

// Yellow light ON, others OFF

digitalWrite(redLED, LOW); // Turn off red LED

digitalWrite(yellowLED, HIGH); // Turn on yellow LED

digitalWrite(greenLED, LOW); // Turn off green LED

// Update LCD with LED status

lcd.setCursor(0, 1); // Move cursor to the second row

lcd.print("Yellow LED ON"); // Print status to the LCD

delay(5000); // Wait for 5 seconds

// Green light ON, others OFF

digitalWrite(redLED, LOW); // Turn off red LED

digitalWrite(yellowLED, LOW); // Turn off yellow LED

digitalWrite(greenLED, HIGH); // Turn on green LED

// Update LCD with LED status

lcd.setCursor(0, 1); // Move cursor to the second row

lcd.print("Green LED ON "); // Print status to the LCD

delay(3000); // Wait for 3 seconds

// Yellow light ON before switching to red

digitalWrite(redLED, LOW); // Turn off red LED

digitalWrite(yellowLED, HIGH); // Turn on yellow LED

digitalWrite(greenLED, LOW); // Turn off green LED

// Update LCD with LED status

lcd.setCursor(0, 1); // Move cursor to the second row

lcd.print("Yellow LED ON"); // Print status to the LCD

delay(2000); // Wait for 2 seconds

}