**🔴🟢🔵 TAP-Controlled Multi-LED System**

**🔧 Project Title**

**"Multi-Tap Touch Sensor Controlled LED Indicator with Audio-Visual Feedback using Arduino"**

**🎯 Objective**

To control three LEDs (Red, Green, and Blue) using a touch sensor. Based on the number of taps (1, 2, or 3), a specific LED turns on, the buzzer beeps twice, and the current state is shown on a 16x2 I2C LCD.

**🧰 Components Required**

| **Component** | **Quantity** |
| --- | --- |
| Arduino Uno | 1 |
| TTP223 Touch Sensor | 1 |
| Red LED | 1 |
| Green LED | 1 |
| Blue LED | 1 |
| 220Ω Resistors (for LEDs) | 3 |
| Buzzer (active) | 1 |
| 16x2 I2C LCD | 1 |
| Breadboard + Jumper Wires | As needed |

**⚙️ Circuit Diagram / Connections**

**(URL:-** [**https://app.cirkitdesigner.com/project/970178c0-99fe-4dbd-9f95-216d9de06dce**](https://app.cirkitdesigner.com/project/970178c0-99fe-4dbd-9f95-216d9de06dce)**)**

| **Component** | **Arduino Pin** |
| --- | --- |
| Touch Sensor OUT | D2 |
| Red LED (+) | D3 |
| Green LED (+) | D4 |
| Blue LED (+) | D5 |
| Buzzer (+) | D6 |
| I2C LCD SDA | A4 |
| I2C LCD SCL | A5 |
| All GNDs | GND |
| All VCCs | 5V |

**🧠 Working Principle**

* The touch sensor detects the number of quick taps (within 1 second).
* Based on the tap count:
  + 1 tap → Red LED ON
  + 2 taps → Green LED ON
  + 3 taps → Blue LED ON
  + More than 3 taps → Displays "Invalid Taps"
* A buzzer gives **two beeps** for each valid action.
* The LCD and Serial Monitor display the current LED state.

**🧾 Libraries You Need**

* LiquidCrystal\_I2C

***Install them via the Arduino Library Manager (Sketch → Include Library → Manage Libraries).***

**🖥 Arduino Code**

#include <Wire.h>

#include <LiquidCrystal\_I2C.h>

#define touchPin 2

#define redPin 3

#define greenPin 4

#define bluePin 5

#define buzzerPin 6

LiquidCrystal\_I2C lcd(0x27, 16, 2); // Try 0x3F if 0x27 doesn't work

int touchCount = 0;

unsigned long lastTouchTime = 0;

const unsigned long waitTime = 1000; // 1 second delay after last touch

bool lastTouchState = LOW;

void setup() {

pinMode(touchPin, INPUT);

pinMode(redPin, OUTPUT);

pinMode(greenPin, OUTPUT);

pinMode(bluePin, OUTPUT);

pinMode(buzzerPin, OUTPUT);

lcd.init();

lcd.backlight();

Serial.begin(9600);

lcd.setCursor(0, 0);

lcd.print("Tap to Toggle LED");

}

void loop() {

bool touchState = digitalRead(touchPin);

// Detect rising edge (new touch)

if (touchState == HIGH && lastTouchState == LOW) {

touchCount++;

lastTouchTime = millis();

Serial.print("Touch Count: ");

Serial.println(touchCount);

}

lastTouchState = touchState;

// If there's been no new tap for 1 sec, execute action

if (touchCount > 0 && (millis() - lastTouchTime > waitTime)) {

performAction(touchCount);

touchCount = 0;

}

}

void performAction(int count) {

// Turn off all LEDs

digitalWrite(redPin, LOW);

digitalWrite(greenPin, LOW);

digitalWrite(bluePin, LOW);

lcd.clear();

switch (count) {

case 1:

digitalWrite(redPin, HIGH);

lcd.print("RED LED ON");

Serial.println("RED LED ON");

break;

case 2:

digitalWrite(greenPin, HIGH);

lcd.print("GREEN LED ON");

Serial.println("GREEN LED ON");

break;

case 3:

digitalWrite(bluePin, HIGH);

lcd.print("BLUE LED ON");

Serial.println("BLUE LED ON");

break;

default:

lcd.print("Invalid Taps");

Serial.println("Invalid Tap Count");

return;

}

// Beep twice

for (int i = 0; i < 2; i++) {

digitalWrite(buzzerPin, HIGH);

delay(150);

digitalWrite(buzzerPin, LOW);

delay(150);

}

}

**🧪 Test Instructions**

1. Power up the Arduino Uno.
2. Touch the sensor:
   * 1 tap → Red LED should light up and show "RED LED ON" on LCD.
   * 2 taps → Green LED should light up and show "GREEN LED ON".
   * 3 taps → Blue LED should light up and show "BLUE LED ON".
   * 4+ taps → LCD shows "Invalid Taps" and nothing turns on.
3. The buzzer should beep twice for every valid action.