NeoPixel LED Chaser using Arduino

1. Introduction

This project controls a small strip of NeoPixel LEDs using an Arduino, creating a colorful chasing effect with red, green, and blue colors. It demonstrates basic LED animation techniques.

2. Key Components

- Arduino Uno (or any compatible board)
- NeoPixel LED Strip (4 LEDs)
- Adafruit NeoPixel Library
- Jumper wires
- External power supply (if needed)
- USB cable for programming and power

3. Working Principle

1. Initialization: The NeoPixel library is initialized and LEDs are cleared at startup.

2. Chasing Colors: The `loop()` function sequentially calls a `chase()` function with Red, Green, and Blue colors.

3. chase() Function:

- Lights up LEDs one by one in a moving pattern.
- After 4 LEDs are ON, the earliest LED is turned OFF creating a smooth chasing effect.

4. LED Update: The strip is updated in real-time with a 25ms delay between steps for visible motion.

4. Circuit Overview

- DIN (Data Input) of NeoPixel -> Digital Pin 6 on Arduino
- VCC of NeoPixel -> 5V on Arduino
- GND of NeoPixel -> GND on Arduino
- (Use an external power source if NeoPixel strip is long)

5. Code

```
// Code Written by-
// Fuad Hasan
// BME, KUET
```

```
#include <Adafruit_NeoPixel.h>

#define PIN 6
#define N_LEDS 4

Adafruit_NeoPixel strip = Adafruit_NeoPixel(N_LEDS, PIN, NEO_GRB + NEO_KHZ800);

void setup() {
  strip.begin();
  strip.show(); // Clear all LEDs at start
}

void loop() {
  chase(strip.Color(255, 0, 0));   // Red
  chase(strip.Color(0, 255, 0));   // Green
  chase(strip.Color(0, 0, 255));   // Blue
}

static void chase(uint32_t c) {
  for (uint16_t i = 0; i < strip.numPixels() + 4; i++) {
    if (i < strip.numPixels()) {
      strip.setPixelColor(i, c); // Turn ON the i-th pixel
    }
    if (i >= 4) {
      strip.setPixelColor(i-4, 0); // Turn OFF the pixel 4 steps behind
    }
    strip.show();
    delay(25);
  }
}
```

6. Code Explanation

Library and Definitions

- `Adafruit_NeoPixel.h` library is included for controlling the NeoPixel.

- `PIN` is set to 6 and `N_LEDS` is set to 4.

Setup Function

- Initializes the NeoPixel strip.

- Calls `strip.show()` to clear any previous LED state.

Loop Function

- Sequentially runs the `chase()` function with Red, Green, and Blue colors.

chase() Function

- Lights up LEDs one by one.

- After 4 LEDs, it turns OFF the LED that was lit earlier.

- `strip.show()` updates the LEDs.

- `delay(25)` provides a smooth transition.

7. Conclusion

This Arduino project successfully demonstrates a basic but visually appealing LED chasing effect using a NeoPixel strip. It forms a fundamental base for developing more complex LED animations and lighting effects.