RGB LED Implementation

Application Status RGB LED

Our Implementation

RGB LED Status Colors

- About the Implementation
  - Create a function for initializing the RGB LED settings per channel (R, G, and B), GPIO for each channel and timer configuration.
  - Create function for setting the colors based on duty cycle for each channel.
  - Create specific color functions to use as application status indicators.
  - We will then test these functions in the main.c file, but we will use them later to indicate the WLAN application status (*WiFi application started*, *HTTP server started*, *WiFi connected*).

LED Control (LEDC) ESP-IDF, in Brief

LED Control (LEDC) Peripheral

LED Control (LEDC) ESP-IDF

- About & Suggested Reading
  - About LED Control (LEDC) and API Reference → https://docs.espressif.com/projects/esp-idf/en/latest/esp32/api-reference/peripherals/ledc.html
  - Primarily designed for LED intensity control and PWM signal generation.
  - 16 Channels – 2 Groups → 8 channels for high-speed mode and 8 low-speed.

LED Control (LEDC) ESP-IDF

- Configuration Steps & Other Details

  - Timer Configuration → Each timer counts upwards, and the bits defined, determines the count number before it resets, and frequency determines the amount of time it takes to count to that number. We will set members of the ledc_timer_config_t structure and pass the configuration to, ledc_timer_config.

  - Channel Configuration→ When defined, the GPIO pin that the PWM output signal appears on, is specified along with the timer that is associated with that Channel. We will set members of the ledc_channel_config_t struct and pass the configuration to, ledc_channel_config.

  - Set/Update Duty Cycle → The time duration within a period that the PWM output signal will be high before it goes low. We'll manipulate the duty cycle to create colors, by calling ledc_set_duty, then ledc_update_duty.

Creating the Status LED Colors

Color Functions

- RGB Set Color Function
  - We'll create a function that sets the color by updating the duty cycle per channel (R, G, B)
- The Status Functions Call the Set Color Function at Specified Duty Cycles

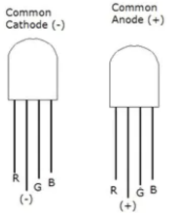
  Note: (Use This Link for Color Selection input parameters shown below)

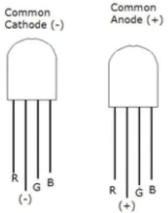
  - WiFi Started → RGB input values to our rgb_set_color function (255, 102, 255).
  - HTTP Server Started → RGB input values to rgb_set_color (204, 255, 51).
  - WiFi Connected → RGB input values to rgb_set_color (0, 255, 153).

Hardware Setup

RGB LEDs

- Connecting RGB LEDs
  - RGB LEDs come in different types e.g.



  - Check the datasheet for your RGB LED to verify the required resistor values. Make connections with your jumper wires from the defined GPIOs (R, G, B) from the DevKit to the RGB LED.
  - Common Anode/Cathode → 

Make the connections based on the diagram (note the long-leg difference – ground vs. positive voltage).

Let’s get started!