

Assignment 4 – ADC & PWM (Timer)

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Objective

In this assignment, you will control the brightness of the RGB LED on the UAS Technikum Wien Click-Shield using the STM32L432KC Nucleo development board. The brightness level is controlled by reading the position of the built-in potentiometer on the Click-Shield and mapping its voltage to a PWM duty cycle.

- The analog input is the onboard potentiometer
- The output is one of the RGB LED channels

Refer to the Click-Shield schematics on Moodle to find the correct ADC input channel and RGB LED output pins.

Your personal configuration parameters are provided in Moodle via the test: “Get assignment 4 parameters.”

Task Description (7.5 points)

Functional Goals

- Use the assigned Basic Timer (e.g., TIM6 or TIM7) to generate a periodic interrupt every 100 ms.
- Use the PWM Timer that corresponds to your assigned LED color
- In the Basic Timer Callback Function:
 - Read the analog voltage from the Click-Shield potentiometer
 - Map the ADC value (0–4095) to a duty cycle between 0% and 100%, with an offset to account for the LED turn-on threshold.
 - Update the PWM duty cycle accordingly
 - Think about a suitable PWM frequency

UART Output

- Print the raw ADC value.
- Print the calculated brightness in %.
- Print the calculated pulse width in μs (based on the fixed period of your PWM timer).

Measurement

- Use a logic analyzer to measure the PWM period and pulse width on the RGB LED pin.
- Take a screenshot showing that the measured pulse width matches the UART output.

Implementation Notes

- Configure the RGB LED pin for maximum GPIO speed.
- Include an offset in the PWM mapping to ensure the LED turns on reliably (e.g., start at ~10–15% duty).
- Follow a layered code structure — avoid implementing logic directly in main.c.

Grading Criteria

The grading criteria are functionality, code quality, modularity, and structuring.