

Lab 10: Zephyr PWM

Medical Electrical Equipment (BME590L)

2023-05-11

1 PWM Fun

- Create a new project based on your submitted ADC blinking LED project.
- For `AIN0`, instead of blinking LED 3, have the LED be constantly “on”, but have its brightness linearly modulated by the input voltage (i.e., 0 V → not illuminated, 3.3 V → full brightness).
- For `AIN1`, instead of blinking LED 2 on/off at a discrete frequency based on your input voltage, have the ADC input value “smoothly” modulate the LED brightness in a sawtooth manner at the same frequency range as the previous lab exercise.
- **Extra Credit:** Instead of a sawtooth oscillation of LED 2 brightness, try to modulate it in an even smoother sinusoidal pattern.

2 Testing

- Using the power supply and oscilloscope:
 - Quantify how linear the relationship is between the voltage applied to `AIN0` and the LED 3 brightness.
 - Quantify how linear the relationship is between the voltage applied to `AIN1` and the amplitude and frequency of the LED 2 brightness.
- You can choose the best way to quantify this relationship.
- Generate a PDF showing your measurement data and associated analysis, and include this PDF in your submitted zip archive.

3 What to Submit & Grading

This lab exercise is due Friday, March 31 at 17:00.

- Upload a zip archive of your project to Gradescope. Your zip archive should include all of your project files to build your application **and** the PDF of your functional measurement analysis.¹
- Please make sure that your uploaded zip archive does not include:

¹If you are using a git repository, the zip archive you can download through the web interface should be appropriate.

- A `build/` directory.
- A `.git/` directory.
- Any Zephyr / Nordic SDK installation files (e.g., `ncs/`).
- Code will be graded on functionality **and** efficiency of code logic **and** code "readability". "Readability" does not mean a lot of verbose comments; it means that the structure of the code, the naming of variables, etc. convey meaning and logical flow.
- Rigor of your quantitative functional analysis will be evaluated. If the relationship is not as your expected, please include some discussion as to why this may be.
- Extra credit will allow your grade for the lab to potentially be >100%.