HW2

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Motivation

Inspired by the H Bridge experiment as shown in figure 1. Note that S1, S2, S3 and S4 are transistors as switches. In our experiment, we try to use two LEDs to model the two paths S1-M-S4 and S3-M-S2, and we use one LED with variable duty cycle source to model M with variable spinning speed.

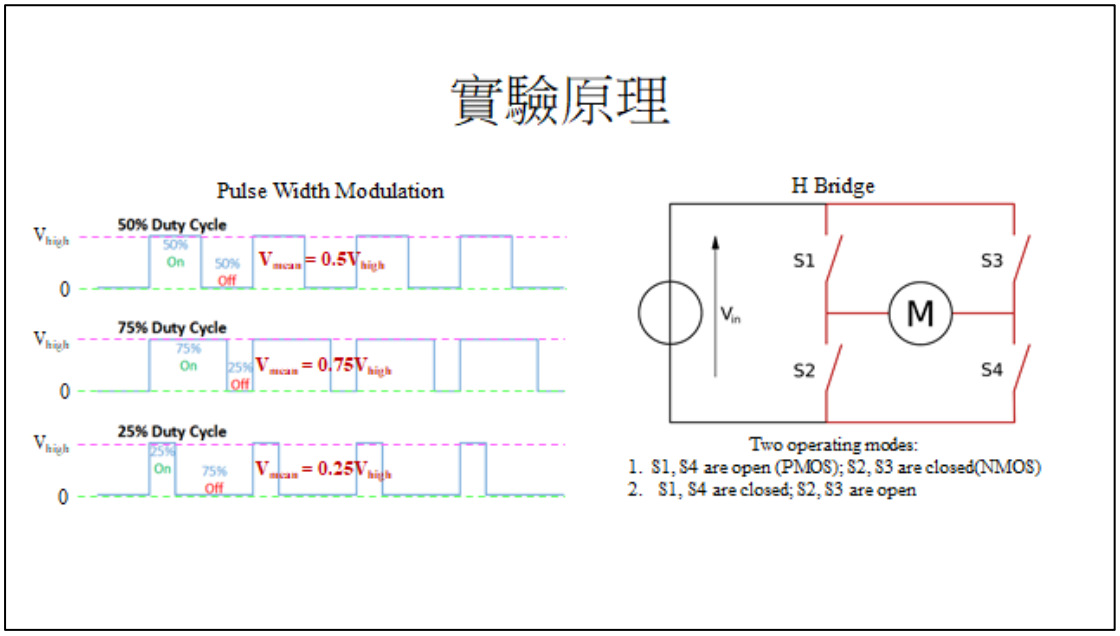

Figure 1

Experiment

We use a button interrupt mechanism to choose which LED should be turned on (left or right one), a representation of the choice between the two paths stated above. Meanwhile, we set up a routine which the center LED would go through: the source for the LED has duty cycle of 0.1 initially then the value of duty cycle increases by 0.3 if the value is less than one when we press the button, or otherwise the value is reset to 0.1. Figure 2~5 show the routine. Again, this scenario represents the change of spinning speed of the motor.

Also, we use logic analyzer to check if the waveform of the pulse width modulated source is as expected. The result is shown in figure 6~9

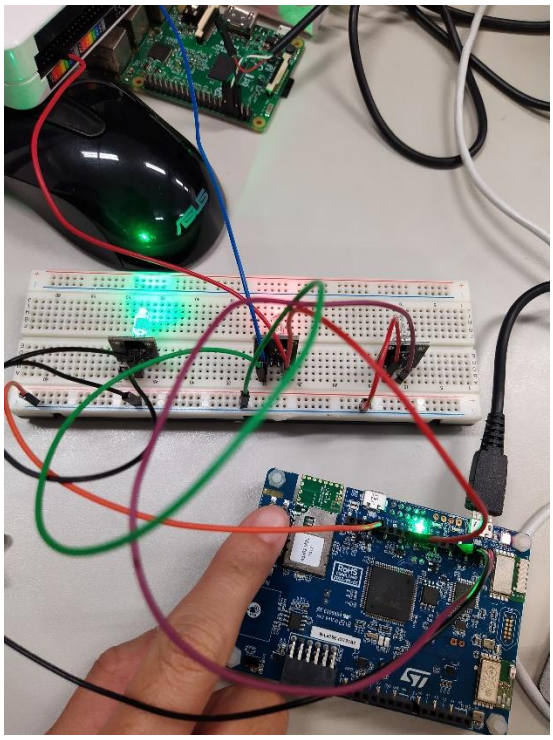

Figure 2 (duty cycle = 0.4)

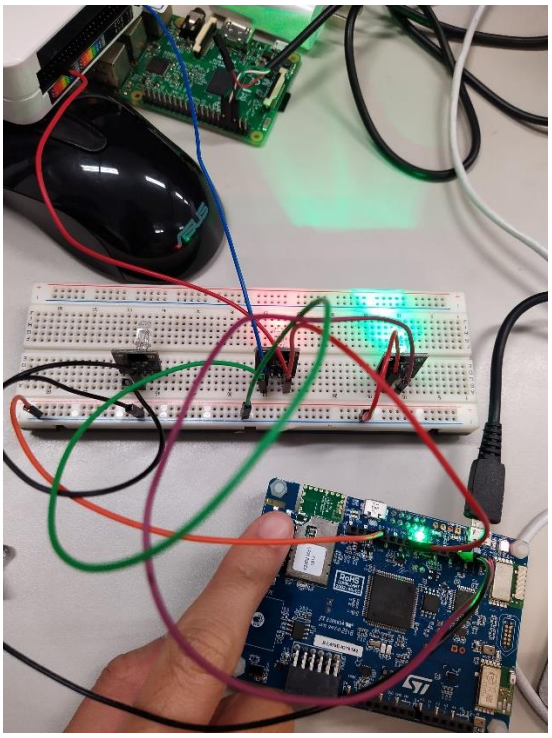

Figure 3 (duty cycle = 0.7)

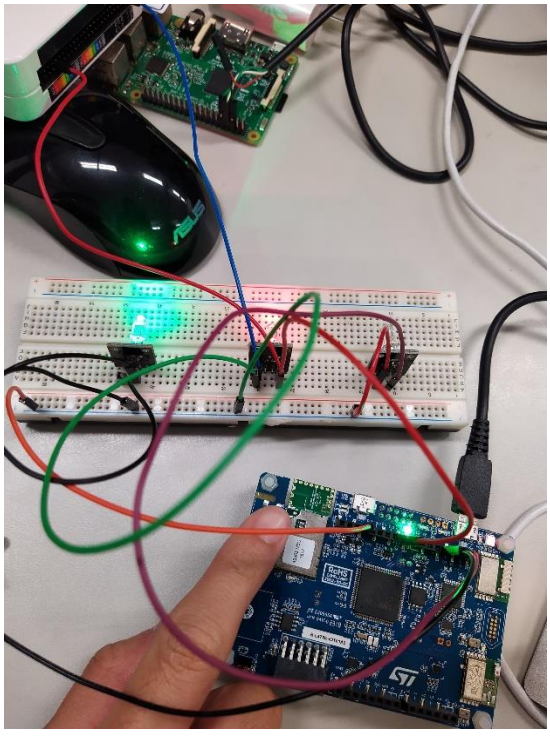

Figure 4 (duty cycle = 1.0)

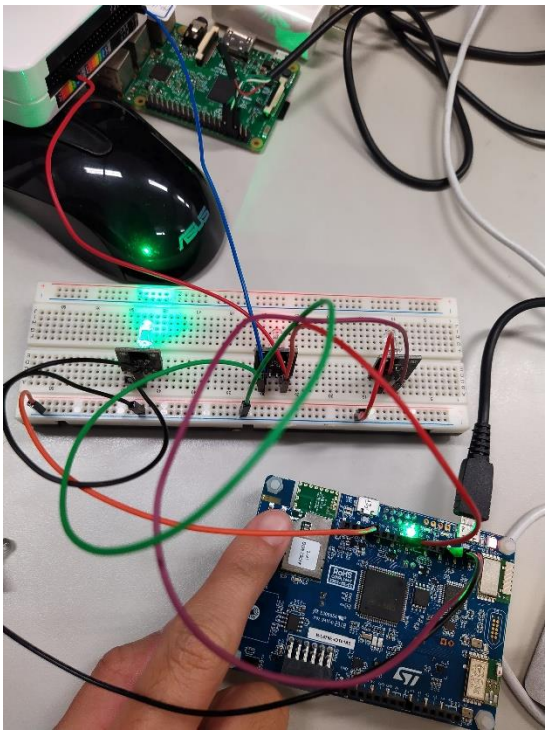

Figure 5 (duty cycle = 0.1)

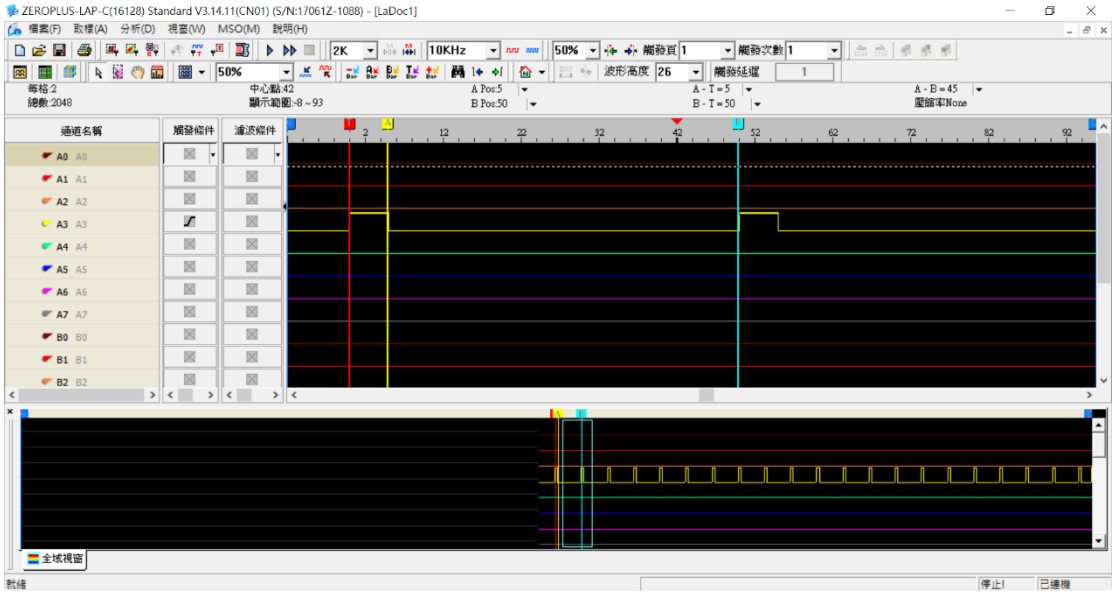

Figure 6 (duty cycle = 0.1)

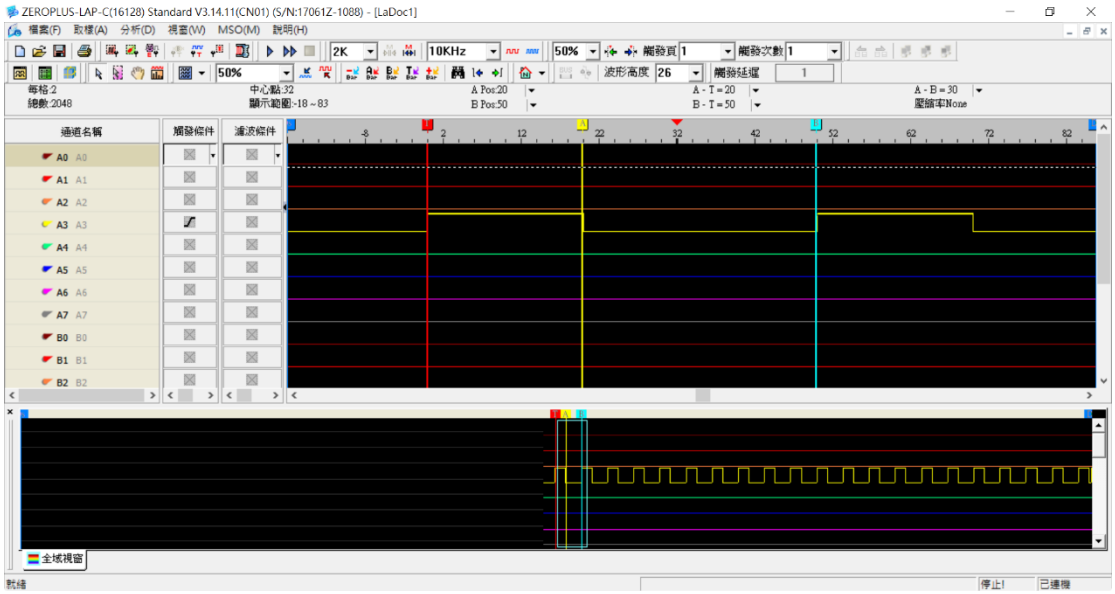

Figure 7 (duty cycle = 0.4)

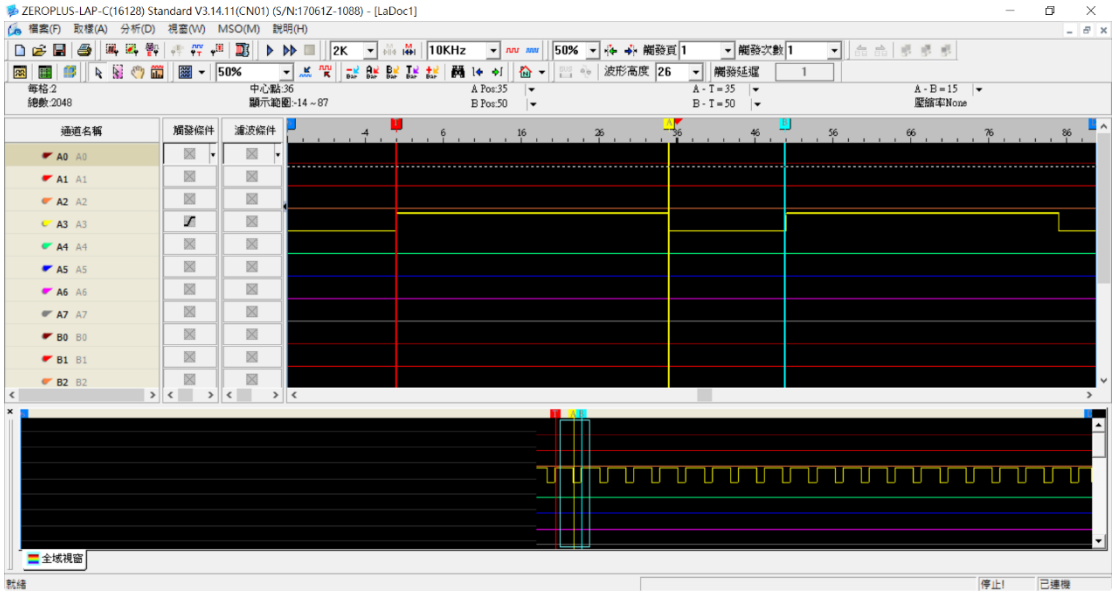

Figure 8 (duty cycle = 0.7)

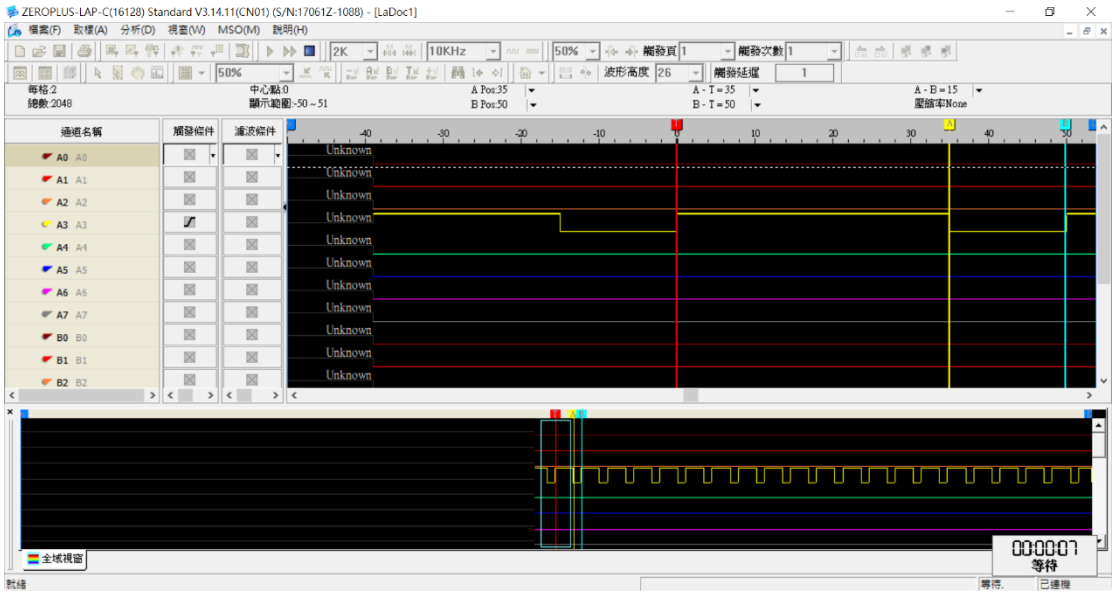

Figure 9 (duty cycle = 1.0)

Discussion

Our design works pretty well at representing the H Bridge experiment conceptually, but maybe we can connect all LEDs in series and do some necessary flips of polarity to make the simulation even closer to the original experiment.