Pre-lab Assignment 7

Due: Fri, 23 Oct 2020 23:59:59 (approximately 48 days ago)
[Score: 4 / 10 points possible]

Just a few questions about Pulse-Width Modulation (PWM) and timer configuration for the STM32.

Academic Integrity Statement [0 ... -100 points]

By typing my name, below, I hereby certify that the work on this prelab is my own and that I have not copied the work of any other student (past or present) while completing it. I understand that if I fail to honor this agreement, I will receive a score of zero for the lab, a one letter drop in my final course grade, and be subject to possible disciplinary action.

Raghuram Selvaraj 

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(1) [1 point]

Which external pins on your development board can be driven by the uncomplemented output of TIM1 channel 1? (See Alternate Function tables on pages 40 - 44 of the STM32F091RCT6 datasheet.) Note that the 64-pin version of the STM32F091, which is what you have on your development board, does not have any external pins for GPIO Port E.

PA8, PB13 

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(2) [1 point]

What bit in the TIM1_BDTR register must be set to observe the PWM output? (State the mnemonic name for the bit rather than its position.)

TIM1_BDTR_MOE 

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(3) [1 point]

Which timer channel outputs can be configured to output to PB10?

TIM2_CH3 

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(4) [1 point]

Assuming that the system clock is 48MHz, what value should be set in the TIM1_PSC register so that the prescaler output is 10 kHz?

4799 ✓

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(5) [1 point]

Assume the TIM1 prescaler output is 10 kHz. If you would like to produce an update event (counter roll-over to zero) 50 times per second, what value should you put in ARR?

95 ✗

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(6) [3 points]

Assuming that the TIM1 prescaler output is 10 kHz, the timer produces an update event 50 times per second, and the timer outputs are configured for PWM mode 1, what is the minimum value that can be written to the TIM1_CCR1 to produce a PWM output with the following (active-high) duty cycles?

0.000%: 0 ✓

35.00%: 33 ✗

100.0%: 34 ✗

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(7) [1 point]

The RGB LEDs you are using are common anode, and you will connect the cathodes to the STM32 outputs configured to use the uncomplemented channel outputs of Timer 1. When a PWM output is set to a 0% duty cycle, is the LED fully on or fully off?

Fully off ✗

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(8) [1 point]

Assume that timer 1 is set up so that all of its outputs are enabled for PWM, and that configuration values are the same as for questions 4-7. Write a single C statement to assign a value to the appropriate TIM1_CCRx register so that an LED whose cathode is connected to the channel 4 output will be illuminated X% of the time. I.e., use X as a variable in your statement. Yes, you can certainly do this with a single C statement (not multiple statements separated by semicolons).

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TIM1->CCR4 = 95;
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