## Specialist Diploma in Embedded Systems: ED5502 Spring 2019, Homework 5

This homework sheet counts for 5% of the module assessment.

Submission date: Friday, 19 April 2019 (Week 13)

Version 1.1: Corrected Q3 to refer to TIMx\_CCMR1 and changed submission date to agree with Sulis.

**Q1 (Input Capture, TIM2)**

See Chapter 31 of the STM32F4/L4 etc Programming Manual for TIM2 details. (You don’t need to read the chapter to answer this question, we have covered this material in lectures).

Two successive input capture values have been obtained by reading the TIM2\_CCR1 register after input capture events. The first (starting edge) is 5000, and the second (ending edge) is 10040. Given the following information:

TIM2\_ARR has been set to 0xffffffff (maximum value)

No timer overflow has occurred.

The TIM2 Clock input was set to 50 MHz

The TIM2 Prescaler has been set to 999. (Remember that the actual prescale value is Prescaler Register value + 1).

1. What is the time period that elapsed between the two capture events?
2. What is the resolution of the timing measurements that can be obtained with this register setup?

**Q2 (Input Capture, TIM1)**

In a given application, the TIM1 counter (CNT) clock source has been set to 80 MHz with a prescaler setting of zero (actual prescale value =1). TIM1\_ARR has been set to 0xffff (maximum value).

1. What is the resolution of the timing measurements that can be obtained with this register setup?

(Hint: the maximum frequency will half the maximum sampling frequency, or the minimum time will be twice the period of the shortest clock pulse).

1. What is the longest time period that can be measured with this setup, without counting timer overflows?

**Q3 (Input Capture, TIM2)**

Refer to Pages 1067-1071 of the STM32L476RG Reference Manual.

1. Which bits of the TIMx\_CCMR1 (Timer Capture Compare Mode Register 1) do I need to set to ensure that Channel 2 of the timer I am using is set as an input?
2. I need to set Channel 2 as the Direct Input Capture Input to the Timer (on TI2). What setting should I write to the target bits to ensure that this option is selected?

**Q4 (STM32L476 Pin Use)**

Due to Hardware Design restrictions, I am constrained to use pins PC6 and PB8 as Timer Input Capture and Output Compare channels respectively.

What Timers and which Channels can I use in my application?

(See Tables 17 & 18 of the STM32L476RG data sheet).

**Q5 (STM32L476 Pin Use)**

For a given application, I am required to use UART4 for serial communications. What pins of the STM32L476RG microcontroller must I connect to the device with which I am communicating?

(See Tables 17 & 18 of the STM32L476RG data sheet).

**Submission:**

Please submit your answers on Sulis before 5pm Friday 19 April 2019 (Week 13), in plain text, MS Word, pdf or any other readable format.

All questions carry equal marks.