Chase Griswold

ECE 6780-003

TA: Bailey Martin

Prelab Questions 03

3.1 — Prelab 3. Please answer the following questions and hand in as your prelab for Lab 3.

1. List two things you can learn from a peripheral's functional description in the peripheral reference manual?

1) Relevant Registers and Configuration Options

2) Basic Theory of Operation

2. What is the title of the first sub-section in the functional description of timers 2 and 3?

- Not mentioned in the lab manual; look it up!

18.3 TIM2 and TIM3 functional description

18.3.1 Time-base unit

The main block of the programmable timer is a 16-bit/32-bit counter with its related auto-reload register. The counter can count up but also down or both up and down. The counter clock can be divided by a prescaler.

The first subsection is called "Time-base Unit"

3. What is the purpose of the Prescaler (PSC) register?

The PSC register's purpose is to divide the input clock frequency to the timer. (oooh timer foreshadowing). A 0 is PSC register divides the clock by 1, a 1 in the PSC register divides the clock by 2, so the timer would count at half the clock frequency.

4. What is the purpose of the Auto-Reload (ARR) register?

The ARR register can store a value that is the trigger point for resetting the timer and beginning to a new period count.

5. What is the purpose of the Capture/Compare (CCRx) register while the timer is operating in Output Compare mode?

In output compare mode, the output of a GPIO pin is modified when the timer's counter matches the value stored in the CCRx register.

6. What does the duty-cycle of a PWM signal represent?

PWM operates by using a high-frequency rectangular-wave signal, and its period defined by the on/off time is called the ‘duty-cycle’.

From the Handbook: “For example, a period of the rectangular wave with a 50% duty cycle would spend half the period at the high (on) output voltage and the other half at the low (off). A period with 0% duty cycle remains low for the entire duration, and one with a 100% duty cycle remains high.”

7. What is the purpose of the Alternate Function mode for a GPIO pin?

In selecting GPIO pins for a peripheral, there are far more possible signals than the actual number of pins, so many pins maintain multiple alternate functions that can connect across multiple peripherals. Note that only one may used at a time. Hence, alternate function mode of a GPIO pin allows a pin to connect directly to internal peripherals of the STM32F0.

8. In what document can you find the documentation for what GPIO pins have which alternate functions?

It’s found within the device datasheet, not the peripherals manual.