

Dylan Thompson

Homework 6

Microprocessor System Design- ELEN 120

Due 11/6/23

20 points

Problem 1: 10 points

I have configured Timer 2 in a similar manner to the programs provided for part 3 of Lab 5.
Except:

The CPU clock and timer clock are set to 24 MHz instead of 4MHz.

The prescaler (TIM_PSC) is set to 10000

The timer reload register (TIM_ARR) is set to 24

What is the timer 2 interrupt rate?

using an equation I made in lab $\rightarrow \frac{C}{2xy} = Z$

where

(C = clock, x = prescaler, y = reload, and Z = frequency (interrupt rate))

we can calculate the rate.

I'm assuming the prescaler and reload have values of 10000 and 24 and are not set in the code for 24 and 10000 (which would make their actual values 10001 and 25).

$$\frac{24000000}{2(24)(10000)} = 50 \text{ Hz}$$

$$2(24)(10000)$$

50 interrupts per second or 1 interrupt every 20 ms

Problem 2: 10 points

Using the same timer with the CPU clock and timer clock set to 40 MHz:

I want the timer interrupt rate to be once per 10 seconds. What values should I use for TIM_PSC and TIM_ARR?

For full credit, mathematically show me that your answers are correct.

$$1 \text{ per } 10 \text{ sec} = .1 \text{ Hz freq}$$

$$\frac{40,000,000}{x} = .1$$

Problem 2: 10 points

$$2xy$$

Using the same timer with the CPU clock and timer clock set to 40 MHz:

I want the timer interrupt rate to be once per 10 seconds. What values should I use for TIM_PSC and TIM_ARR?

For full credit, mathematically show me that your answers are correct.

$$\frac{20,000,000}{xy} = .1$$

$$200,000,000 = xy$$

TIM_PSC and TIM_ARR can be anything

so long as when multiplied they equal

$$200,000,000.$$

I will choose

$$x = 40,000$$

$$y = 5,000$$

$$\text{TIM_PSC} = 40,000$$

$$\text{TIM_ARR} = 5,000$$