

ECE353 In-Class Exercise

Watchdog Timer

Problem 10A Objectives

- Configure the Watchdog Timer to interrupt after 5 Seconds
- Configure the SysTick Timer to interrupt after 100ms
- Have the SysTick Timer alert the main application to print out a message every 1s

1. Create interrupts.c

- A. Include interrupts.h
- B. Add an extern for a Boolean variable called AlertSysTick
- C. Complete the SysTick handler as described in interrupts.h
- D. Complete the Watchdog handler as described in interrupts.h

2. Create watchdog.c

- A. Implement the function watchdogInit as described at the bottom of watchdog.h
 - a. Enable WATCHDOG0 in RCGCWD
 - b. Wait for WATCHDOG0 to become reading in RCGCWD
 - c. Set the Tick count in the WATCHDOG0 LOAD Register
 - d. Configure WATCHDOG0 to generate interrupts and reset the board in the CTL register
 - e. Set the interrupt priority to 1 using the function NVIC_SetPriority
 - f. Enable interrupts from WATCHDOG0 in the NVIC using NVIC_EnableIRQ.

NOTE: Use the IRQs defined in TM4C123GH6PM.h, line 55 when calling NVIC_SetPriority and EnableIRQ

3. Modify main.c

- A. Create a Boolean global variable called AlertSysTick. This variable will be accessed by both the main routine and the interrupt service handler, so declare it as volatile. Initialize its value to false.
- B. Initialize the SysTick timer so that an interrupt is generated once every 100 milliseconds. Use **SysTick_Config(uint32_t ticks)** to configure the time.
- C. Initialize WATCHDOG0 to interrupt every 5 Seconds
- D. Every 1 second, print out the number of seconds that have passed.

4. Observe Serial Output

If you have configured both the SysTick and Watchdog timer correctly, the systick interrupt should clear the watchdog before the board resets. As a result, a message printing the number of seconds will print every second.

Once you have observed this, comment out the line in the SysTick handler that clears the watchdog. Re-compile and reload the firmware image. After resetting the board, you should observe that the count hangs after it reaches 4 seconds. It will hang for an additional 5 seconds and then reboot the board. The watchdog timers on the TM4C123 only reset the board after two consecutive watchdog timers have not been cleared.

5. What to Turn In

Turn in **watchdog.c** to the dropbox on the course website.