CPE 301 - MICROPROCESSOR SYSTEM DESIGN
Fall 2013

HOMEWORK No. 7

Question #1 is DUE (beginning of class) October 15 (Tuesday)

1. Printout of a WORD document (or equivalent) with one detailed question that you have about how the ATmega timers work or how to program them. 20 points

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Questions #2 - #6 are DUE (beginning of class) October 17 (Thursday)

NOTE: All programs must be handed in as printouts of Arduino Sketch files which have compiled without errors.

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2. Modify the Blink program you did for Lab 5 (Arduino UNO version on page 85 of the textbook) so that the function MyDelay(mSecondsApx) uses the Arduino ATmega2560 timer1 in Normal mode to generate a delay of (mSecondsApx * one millisecond) before returning. 20 points

3. Write an Arduino Mega C++ language program using the Arduino ATmega2560 timer1 in Normal mode to generate a 16 kHz square wave on PortB.6 using Timer 1. 20 points

4. The international tuning standard for musical instruments is “A” above middle C” at a frequency of 440Hz. Write an Arduino Mega C++ language program using the Arduino ATmega2560 timer1 in Normal mode to generate a 12 kHz square wave on PortB.6 using Timer 1. 20 points

5. Write an Arduino Mega C++ language program to generate a 500Hz signal on PortB.6 using Timer 1 in Normal mode. The wave should have a 30% duty cycle (duty cycle = high time / period). 20 points

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Extra Credit question (optional) - Total points possible for this HW = 150

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6. Write an Arduino Mega C++ language function using Timer 1 in Normal mode to open and close a digital camera shutter. Assume when the shutter release is pressed, the shutter speed is passed to your function and that PortB.7 controls the camera shutter. When PortB.7 is 0 the shutter is closed and when PortB.7 is 1 the shutter is open. Assume an initialization program has initialized and cleared PortB.7. 50 points extra credit

Typical shutter speeds are expressed in fractions of a second. Create a table for your function to use to create shutter speeds of: 1, 1/2, 1/4, 1/8, 1/15. 1/30, 1/60, 1/125, 1/250, 1/500, 1/1000. The values passed corresponding to these shutter speeds are 0 through 10. That is, if a 0 is passed the shutter speed is to be 1 second and if a 1 is passed the shutter speed is to be one half second, etc.