

# ECGR3/5/6090, Fall 2003: Lab 6

## Introduction to Timer Interrupts on the MSV30262-SKP

### Learning Objectives

This lab will introduce you to using timer interrupts to generate a square wave on a MSV30262-SKP board.

### General Information

The general steps for this lab are:

1. Create a new folder for lab 6. Copy your files from lab5 into the new folder.
2. Generate a new project using the files you just copied. Name your new project Lab6.
3. Open and edit your main.c file to perform the lab functions.
4. Program the lab. Don't forget the necessary include files to get the correct functionality.
5. Compile the code into an .x30 file, and load onto the board.
6. Test the program and repeat steps 4, 5, and 6 until the program works as required.
7. Write your lab report.
8. Demonstrate for a TA and turn in your report.

### Prelab Activity

You may use the PCs in Smith 347 or your own PC to do this lab experiment. The machines in Smith 347 already have the software tools loaded.

Compile and make sure the new project is working.

1. What timers are available on the 30262 skp?
2. What features do the timers have and what could they be used for?
3. Show the calculations needed to generate a 1 KHz square wave using timer A.
4. Write the pseudo code for this lab.

### Laboratory Assignments

In this lab you will be utilizing onboard timers and the serial I/O of the starter kit to generate a simple square wave generator. The serial I/O should work at 57600 baud 8 data bits, no parity, and 1 stop bit. Timer A will be used to generate a 1 KHz square wave that is fed to the red led as an output. This will be too fast for you to notice that the led is flashing so you will need to utilize the scopes in the lab to ensure your accuracy. The square wave should start when "S 1000" is received via serial communications. Similarly, it should stop when "s" is received. Commands are separated by return characters (`\r`). Any other command received should be ignored. Bonus: Make the square wave generator accept any "S xxxx" command to generate a variable frequency square wave generator.

### Steps

1. Modify the main.c file and include the appropriate files. Include commenting along the way.
2. Build your program slowly, testing along the way. Perform compiles and solve each requirement one at a time. Make sure comments are written as you progress.

3. Continue to build and test the program until all of the requirements have been met. Did we mention you should write your comments as you progress, not at the end?
4. If you run into problems, use the break point functionality of KD30 to step through the code until you find the problem.
5. Once all the requirements have been met, ensure that everything works.
6. Finish lab write-up and demonstrate for a Lab TA.
7. Submit your main.c and .map file files via a future submission tool (announced in class).

## Requirements

Req. 1 – The code generated is written in C for the MSV30262-SKP

Req. 2 – The code is well commented and easy to follow

Req. 3 – The serial communications should operate at 57600 baud 8,N,1

Req. 4 – Any time "S 1000\r" is received a 1 KHz square wave is generated on the red led

Req. 5 – Any time "s\r" is received the signal stops.

Bonus – Make the square wave generator generic and allow it to accept any "S xxxx\r" command and generate a frequency of xxxx Hz. You are not limited to 9999 Hz you can go up as high as you like.

## Lab Report

Include in your lab report observations and procedure like the following:

*The general learning objectives of this lab were . . .*

*The general steps needed to complete this lab were . . .*

*Some detailed steps to complete this lab were . . . .*

1. *Step one*

2. *Step two*

3. *. . . .*

*Code generated for this lab...*

*Some important observations while completing/testing this lab were . . .*

*In this lab we learned . . . .*