CPE 325: Embedded Systems Laboratory
Laboratory Assignment #10

1. Assignment [100 pts]

Q.1. There are 2 questions embedded inside the tutorial for Lab 10. Answer them in your report. **[2 X 10pts = 20Pts]**

Q.2. Use the **PWM code** from your Lab 6. Create the HEX file using the instructions from tutorial page#25 and show the result (HEX file content) in your report. **[15 Pts]**

Q.3. From the "**.out"** file from your PWM Code, find the following relevant information. What tool did you use? Take a screenshot and put it in your report.

a. What is the magic number used? **[2 pts]**
b. What is the class of this *.out* file? **[2 pts]**
c. What machine was this file built for? **[2 pts]**
d. What is the size of the header? **[2pts]**
e. How many section headers are there? Please verify. You may need to run the command again. **[7 pts]**

Q.4. Use the HEX file you generated in Q.2 to do the followings:

a. Program the given hex file to your microcontroller using the MSP430Flasher tool and paste the output in your report. **[10 pts]**
b. Show that using the Flasher, you can change the Brightness Level as you could in the CCS environment. **[15 pts]**
c. Using the *naken utility* and the steps shown in Section 5.2 of the tutorial, *reverse engineer the hex file to assembly code.* **[5 pts]**
d. *Comment on each line of the assembly code* generated from Q4c above to describe what each line is doing. **[10 pts]**
e. Describe what the program is doing in a neat **flowchart.** You can also write a paragraph to describe in addition to the flowchart. **[10 pts]**

2. Deliverables

Report with multiple screenshots for each of the problems mentioned above and all other deliverables (flowcharts, descriptions, theory, etc.)

3. Theory

1. ELF File Components
2. Naken Utility
3. MSP430 Flasher