Anthony Bartman

EE 4930

Laboratory 7: Final Lab

2/23/2021

Objectives:

The objectives of Lab 7 pertain to combining multiple labs together while using RTOS and learning how to interface with the fan and I2C TMP102 sensor. The student will learn how to congruently use tasks using Lab 6 as a base. The basic idea that is necessary to add to Lab 6 is 2 more tasks and a substantial circuit to use the fan, 'heater' components power by the battery pack, properly. The student will have to reorder the tasks priority levels from the previous lab while considering the new lab 7 implementations. The fan should turn on if desired temperature is + or – 1 degree from the actual temperature from the TMP102 sensor. The heater(or 2-3 resistors in parallel) will turn on or off based on the same conditions as the fan. The student will also need to learn how to edit the .syscfg file in order to set the proper PWM and I2C pins to interface with the hardware. This system can be seen in a demo on box.

Description:

Lab 7 has students create an RTOS system that simulates an igloo environment by adjusting the temperature based on a potentiometer and a I2C TMP102 sensor. This lab only focuses on heating up the igloo if it is too cold. I started off Lab 7 with a base of Lab 6 since it uses a lot of the similar peripherals. I created 2 more tasks with their own stack since the heating fan and temp sensor should be separate from the potentiometer and lcd tasks. Like Lab 6, the potentiometer will change the desired temperature in the igloo. A clock will read the potentiometer every 0.25 seconds and then trigger the HWI and SWI to then update the LCD. The difference in Lab 7 is that the actual temperature from the TMP102 sensor should within +/- 1 degree. If that is true, the fan and heater will either turn on or off depending on the preexisting conditions. The fan and heater are powered by a 6, double AA, Rayovac batteries within a completely separate circuit from the MSP432 board. This circuit can be seen in the physical wire up of the circuit below. The 'heater' is simulated by heating up 2-3 different 33 Ohm Resistors in parallel from the voltage regulator. The task priorities are as follow: 1. HWI, 2. SWI, 3. I2C TMP, 4. PWM FAN, 5. Input Task, 6. Update LCD. These task were chosen in order of highest importance, to lowest importance.

Conclusion:

The results of the lab can be shown in the lab demo on box. I had the most trouble with setting certain pins to be PWM and I2C and work with the RTOS functions. Once I researched how to do these things, it told me I need to edit the.syscfg file to set those certain pins. Another difficult thing I found was how to setup I2C and PWM with RTOS. I looked at many blogs and examples online in order to try and figure these systems out. Overall, I learned how using RTOS

system is a different way of implementing embedded systems instead of using only bare metal embedded.

Attachments:

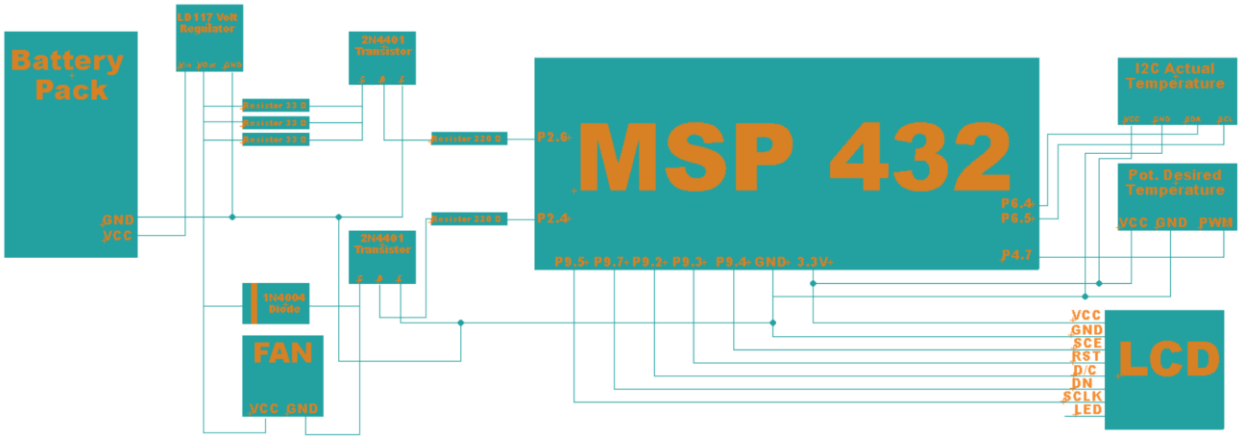

Figure 1: This figure shows the schematic of the lab wired up physically.