SWEN-563/CMPE-663/EEEE-663

Real-Time and Embedded Systems

Project 1

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Problem:

We were given the task of sampling measurements from an oscilloscope and then build a histogram of said measurements, enumerating duplicate samples displaying the findings of 1000 samples. We were required to implement a Power On Self Test where a smoke-esque test was ran, verifying that a pulse was seen within 100milliseconds. User interaction was also required in this project, thus we made use of the UART serial connection. If the POST failed, users were notified and prompted if they wish to run the initial test again. On a passing POST, the sampling of measurements would then take place.

Prior to sampling, the user was prompted if they wanted to change the bounds of which the histogram would show, the default being 950 microseconds to 1050 microseconds. The test would then run for 1000 samples. A timer was enabled and then disabled on the detection of an input capture on the GPIO pin. This process repeated for each of the 1000 samples and results were then tallied and then displayed.

Solution:

With the STM32 and provided components, I wrote in C the functions and source files needed to configure a Timer and GPIO pin to indicate when a rising edge input was captured on the GPIO pin.

I isolated the Timer2 configuration and helper functions in their own file. TIMER.c and TIMER.h respectively. In the C source, wrapped bit operations on registers were given useful names for use throughout the rest of the project.

Another asset of this project included was the input\_pa0\_test source. I modified this code from the original source received from Professor Kiser. This file served as the conduit for getting the GPIO pin configured as well as the timer.

Another borrowed source was the binary search I implemented later in the program. I isolated this functionality as well. The binSearch files made enumerating elements the array of measure samples very efficient. It should be noted that this was an aggregation of snippets found online to accomplish a similar task.

These, in conjunction with my main source and other supplied files such as the UART files, comprised the first project’s codebase.

Technological Facets:

Hardware:

Software: