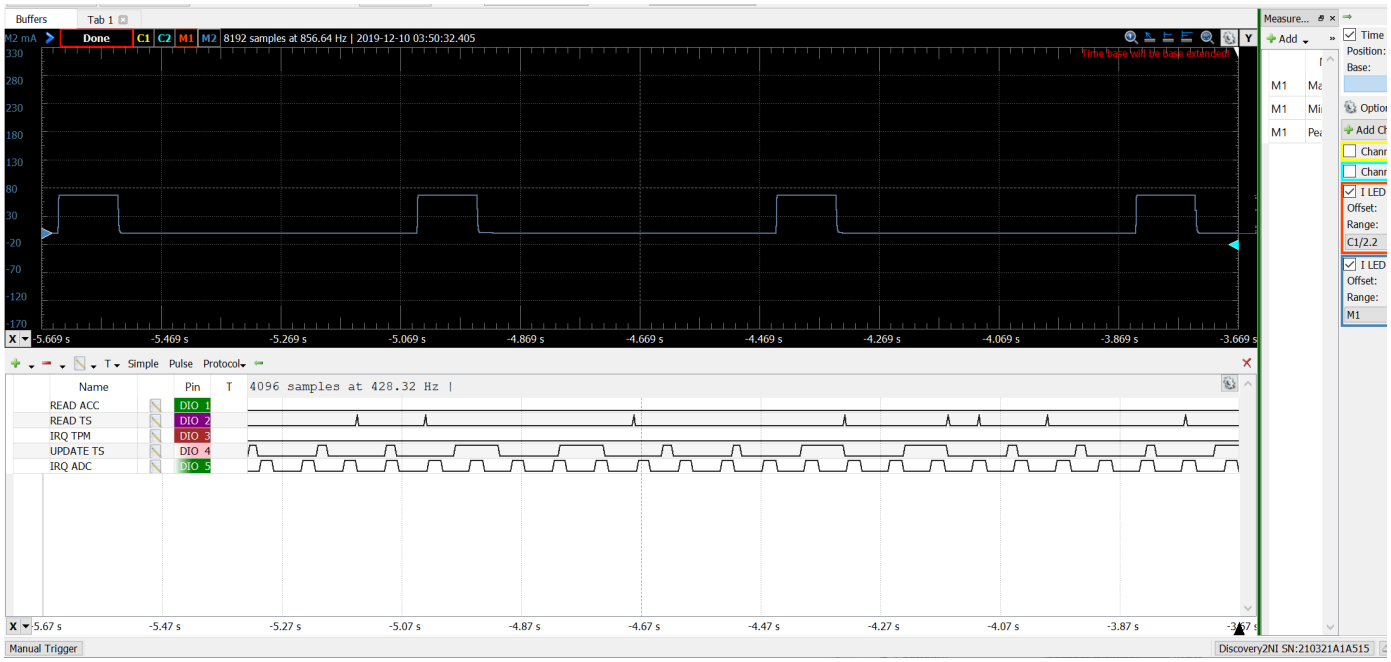
Bennett James

ECE560

Dr. Dean

Project 2 Report

1. Mixed-signal screenshot(s) showing correct system operation. Include any debug signals needed to show that the system is working as specified.



This screenshot shows the necessary debug signals. The period for FLASH_PERIOD is set to 600 ms and the FLASH_ON. This shows my signal working as my ADC is routinely triggered as per the conditions surrounding its IRQ triggers as TPM_MOD is reached.

2. Explanation of how your code shares current data between Control_HBLED and the plotting thread, and how the display is synchronized to the start of each flash. Use diagrams as needed.

My code shares the current data from the Control_HBLED by writing it to an array that waits until full to write to the display. The array stores the values of the g_set_current and g_measured_current until we have sampled 960 values these values are then condensed down to 240 values in which they are written to a pixel to be drawn.

To synchronize the display to the start of each flash, I implemented a small FSM at the end of Control_HBLED that initialized the first 100 samples of to 0 which is equivalent to the first 25 pixels. This gives some cushion from the left side of the screen to allow for easier viewing of the signal. From here the state machines waits for the g_set_current to change from zero as I know that this value will change before the g_measured current. This is because the g_measured_current tracks the g_set_current.

From here the FSM goes to a sampling state in which it samples the next 860 values to fill the array. Once the array is full the lines are drawn accordingly to the values and necessary signals are changed to allow for the next lines to be drawn at the next flash.

3. ECE 560: Text (with supporting mixed-signal screenshot(s)) showing your analysis of how many queued A/D conversions can be serviced between two priority conversions.

I was able to determine that I could complete 32 ADC conversions from the queue before the ADC was needed for priority conversions. I determined the time it took to complete one queued conversion was 21/32 = 0.65625 us. The number was calculated with respect to the time between a new current measurement, which is 21 us. I used this method due to the immensely short time between priority conversions and established a large queue to dequeue from and count the number of conversions completed.

4. Text for each screenshot explaining what it shows and why it means your system is working.

Explanation of what you did for extra credit.

- Change color scheme to represent NC State's color
    - Adjustable values are now red
    - Non-adjustable values are now light gray
- YouTube Video can be found at https://youtu.be/6gRDvIBQVgA