

Michael Eller

ECE 3430

Lab 4

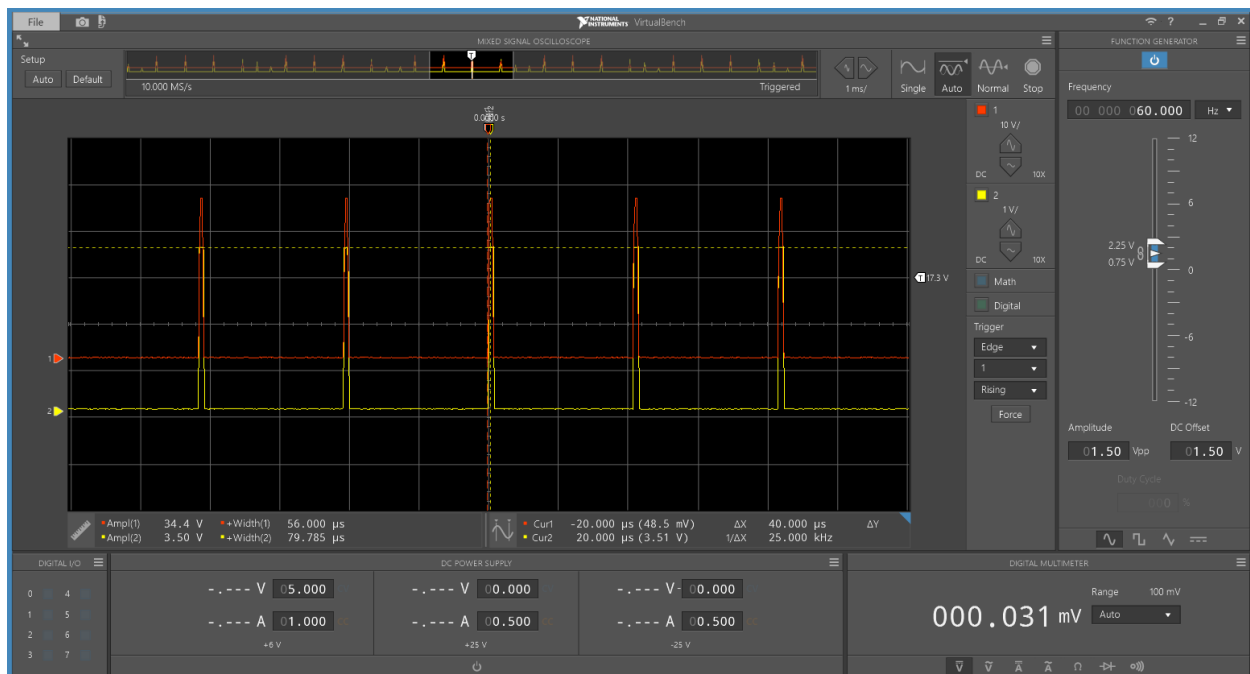
21 September 2015

Signal Sampling

Goals:

The purpose of this laboratory was to use the MSP430's analog to digital conversion (ADC), timers, and interrupts to sample continuous-time signals. Code optimization was important to simplify the averaging math and ensure accurate sampling. Steps were taken to minimize code within the filter routine to accomplish this task.

Filter Function:



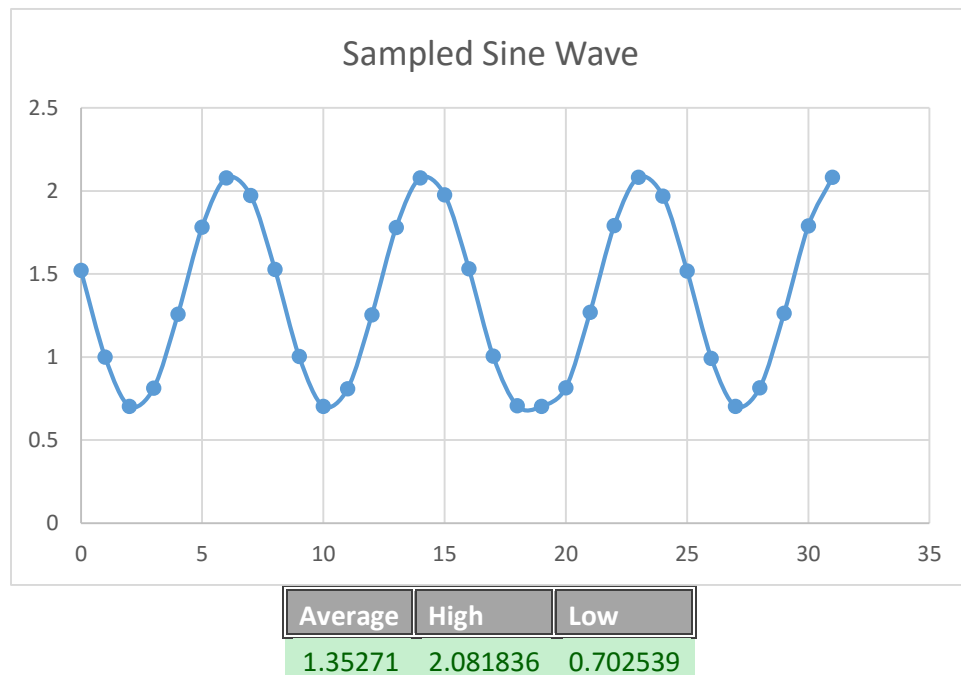
Scope Settings:

- DC coupling
- 10X probes
- Trigger rising edge
- Sample acquisition

LED	Positive Width
Green (filter function)	56 μ s
Red (timer function)	80 μ s

The pulse width of the functions was decreased significantly by optimizing out for loops and division (120 μ s vs 60 μ s). The fact that the filter function only take 56 μ s shows that it is fast and efficient.

Sinusoid Sampling:



Note: The offset was set to 0.75V on the function generator; however, both the MSP430 and the oscilloscope read closer to 1.5V.

The average from the filter function came out to be 1.35V, but the average was slowly rising. It would have been beneficial to let the program run longer to achieve a more accurate average.

Possible sources of error were that the MSP430 was not calibrated properly and that it can only hold values from 0 to 1024. A larger buffer would also make the average more accurate.

Setting Up the Project:

To reproduce the results shown above:

- (with Rice 240 equipment) set function generator to 0.75V offset and 0.75V amplitude
- attach the ground clip to the GND pin on the MSP430 and the signal clip to pin 1.7
- begin debugging and pause to view the values in memory