ECE474/574 - Lab 6

Due Friday, May 27th 2016

Introduction

For this lab you will make a voltmeter with the ADC128S022 ADC chip that is on the DE0-Nano board. The voltage detected will be displayed with the 4 digit display.

Assignment

To get data from the ADC you need to query it with a custom serial interface similar to SPI. You will need to design your own serial interface that can start the conversion and then clock the binary voltage data out.

The voltage reading on the 4 digit display should be updated about twice a second (2Hz). To accomplish this, create a signal at this rate to start an ADC conversion using a slower clock or counter. Since the ADC can convert the analog voltage at a rate of roughly 200kSPS at the maximum clock rate (3MHz), there will be no need to provide any feedback to the signal that starts the conversion.

The clock boundary crossing between the "start_adc" signal and the ADC control state machine should be traversed with a synchronizer unless both are running at the same clock domain. We will check for this at checkoff.

The ADC returns a raw binary voltage where the LSB is 3.3V/4096 (volts). You will need to use either logic or a ROM look up table (voltage.mif file provided) to convert from binary word to a BCD formated voltage. The voltage should be displayed with millivolt precision (make sure to include a decimal place).

Checkoff

You will need to upload your code and a block diagram to TEACH along with getting it checked off in person. Program the FPGA in front of a TA and demonstrate the working code. Your code will be checked for safe clock crossings.