

EE 3921 Lab 5: NIOS Continued

1 dedicated lab period, 2 lab periods to complete

Name: _____

Objectives

- Advanced NIOS II hardware design
- Advanced NIOS II software design

Prelab

- Review the NIOS II class notes

student
check off

Assignment

Part 1: **Create a Nios II based system that outputs graphical information to a VGA monitor using the elements of the Video Library**

- 1) Write software using the Eclipse tool to run the embedded microcontroller design. The software needs to draw a white box somewhere on the screen. You can find various pixel-based functions in `Altera_up_avalon_video_pixel_buffer_dma.h`

Part 2: **NIOS II VGA system enhancements**

- 1) Add color selection functionality to your design. Use at least one switch input for each color (R, G, & B), more if you want more color options. Draw the rectangle using the selected color. Check the switches at least twice per second so it will pick up any changes in the switch settings.
- 2) Draw an 'X' in the rectangle (corner-to-corner) using the same color. Note that the pixel software defaults to 16-bit color, with 5 bits for red (starting with the MSB), then 6 bits for green, and finally 5 bits for blue (ending in the LSB).

Part 3: **Create an 'Etch-a-sketch'.**

- 1) Start by drawing a pixel in the center of the VGA screen.
- 2) Each time the KEY pushbuttons (one for x, one for y) are pressed, draw another pixel according to the following rules:
 - a. For SW(0) = 0 put the new pixel to the left of the previous one.
 - b. For SW(0) = 1 put the new pixel to the right of the previous one.
 - c. For SW(1) = 0 put the new pixel below the previous one.
 - d. For SW(1) = 1 put the new pixel above the previous one.Diagonal movement is encouraged
Continuous push is allowed
- 3) Provide a mechanism for clearing the screen and starting over.

Check Off

You must demonstrate your working design(s) prior to the end of the 2nd lab period

- Demo part 1 20% _____
- Demo part 2 40% _____
- Demo part 3 20% _____

Lab Report (informal)

- Due at 4:00 pm, 1 day after 2nd lab – in the box
- Include a properly documented informal lab report. 20% _____