

## LAB Assignment #10, for ECE 338

Assigned Nov. 19th

Due Nov. 28th

### Description: Create and demo the pong game

Use either lab 8 or lab 9 as a starter for lab 10.

Copy the VHDL for the pong\_graph\_st on slide 37 through 49 of the 'VGA documentation and VHDL code' slide set into a vhd file called pong.vhd.

Find the **two lines** that begin with:

```
if ( btn(1) = '0' and ...
```

And change '0' to '1' **IN BOTH LINES**

Find the line that begins with:

```
refr_tick <= '1' when (pix_y = 481) and (pix_x = 0)
```

Change pix\_y = 481 to pix\_y = 1

Change pix\_x = 0 to pix\_x = 1

Create an instance of pong\_graph\_st in the Top module

Delete/comment out the existing assignment to hdmi\_red, hdmi\_green and hdmi\_blue and use the graph\_rgb(2 downto 0) signals from pong\_graph\_st to drive these hdmi\_xxx signals instead

Either connect the switches sw\_r and sw\_g currently in Top.vhd to the btn(1) and btn(0) in pong\_graph\_st, or modify the Top.vhd, design\_1\_wrapper.vhd and the xdc file to use the buttons instead of the switches.

Synthesize your design, program your board and prepare to demonstrate your pong game.

This lab is worth 10 points and requires a quick hardware demo.