COE3DQ5-Lab #1 report

Group 6

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Monday, January 19, 2015

Exercise 1:

The first task that had to be accomplished in this exercise was to make the 8 different boxes on the LCD panel. To do this we divided up the panel into 8 different squares using the pixel size 800x480 and displayed different colours on each square. To implement the next part where the colours had to be decremented by 1 every second, we used a counter. Timer was in charge of keeping track of how many clock cycles have gone by and once 50 million clock cycles have gone by, the colour would be decremented. Once that was taken care of, the portion where we consider the direction according to touch had to be done. To do this portion we used a flag and flipped the flag according to touch and where the touch occurs. The last part in this exercise was to display how many squares contained each colour. To implement this we used a counter called quantity and would increment it according to the colour values.

Exercise 2:

To compute the grayscale intensity of pixel "i", we need to read these values Y[i-2], Y[i-1], Y[i], Y[i+1], and Y[i+2] from the "In" line buffer. We added five registers for these five values. To compute Y[0], which is the lead-in case, Y[2], Y[1], and Y[0] are needed, and we monitor the third and fourth bit of the filter_en signal. Once the third bit of filter_en is high while fourth bit of the filter_en is low, we pass the Y[0] to Y[-2] and Y[-1]. For other cases, we just pass the calculated Y to Y[i+2], Y[i+2] to Y[i+1], Y[i+1] to Y[i], Y[i] to Y[i-1], and Y[-1] to Y[i-2]. For the lead out cases, it is the same as the given cases. To solve the shifting issue observed in the lab, we pass the fourth bit of filter_en as the write enable signal for "Out" line buffer when 3-tap filter (in lab) is applied, and we pass the fifth bit of filter_en as the write enable signal for "Out" line buffer when seventh (take-home assignment) filter is applied.

The computation of grayscale intensity is done in 12 bits. For the clipping, we check for the first bit of the calculated value. If it is high, we check bit 11 to 6, then if any of them is low, we clip it to 8'd255. If the first bit is low, we check bit 11 to 7, then if any of them is high, we clip it to 8'd255; then we check if bit 6 is high and any of bit 5 to 0 is high, then we clip it to 8'd255. If none of the above cases is true, we keep bit 7 to 0 from the result.