COE4DS4 Lab #1 Report – Group 3

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Exercise #1

In order to divide the touch panel LCD into four regions, a 4-element array of 3-bit registers was initialized to hold the color values of the four regions. The RGB values which are inputted into the LCD Data Controller is derived from one of the values of this array, which is selected depending on the X and Y coordinates that are outputted from it.

Implementing a counter is easy once it was acknowledged that the clock cycles at 50MHz. To count a single second, a modulo 50000 counter is used to count milliseconds, which in turn is cascaded with a modulo 1000 counter. The values in these counters are reset to zero each time the user stops touching the LCD panel or when the quadrant that is being touched changes. At each successful second that is counted, a flag is asserted for a single clock cycle, indicating that the active quadrant is to change its colour. The values shown on the 7-segment displays are appropriately incremented or reset using the same logic as the millisecond counter.

The most common colour is calculated using a register array that contains the amount of times a specific color is present in the grid. This register array is updated and checked when the LCD touch panel is not being touched.

Exercise #2

The source files from *experiment 3* were changed such that the *Filter_Pipe* model accepts the fourth switch as input. This switch is used in the implementation of the sixth, as per the requirements of this exercise.

Since these two new filter methods introduced calculations using luminance values from pixels that are located at a distance of 2 pixels away from the current pixel, changes are made to account for the new variables. Specifically, modifications account for cases where luminance calculations are being done at the edge of the LCD display. This is done by implementing logic to a shift register that stores the previous values of the write enable to the first dual port RAM.