CS M152A Final Lab Proposal

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Design Description:

For our project, we will create a calculator on the FPGA board with the keypad module. It will support four operations: addition, subtraction, multiplication, and division of integers. We will use the keypad for input, mapping each operation to a letter key. Outputs will be displayed on the onboard 7-segment display.

Operation:

A number must be entered using the keypad. Any integer that fits on four digits works
The number must be followed up by one of the operator buttons that correspond to the four operations.
After that, another number must be entered.
Then, the equals button must be entered. The 7 segment display will calculate the value of (First Number) (Operator) (Second Number), and display that if it fits on the display.
After that, it resets to a state after the first stage, where the result is acting as the first number.
At any point, the clear button can be pressed to reset the calculator.

Correctness Rubric

Equation Input Functionality (40%) When two numbers are entered with an operator pressed in between, the result is an attempted calculation of (First Number) (Operator) (Second Number)
Addition Functionality (10%) When two numbers are entered with the plus button pressed in between, the result after hitting equals is the sum of the two numbers.
Subtraction Functionality (10%) When two numbers are entered with the subtraction button pressed in between, the result after hitting equals is the difference of the two numbers.
Multiplication Functionality (10%) When two numbers are entered with the multiply button pressed in between, the result after hitting equals is the product of the two numbers.
Division Functionality (15%) When two numbers are entered with the multiply button pressed in between, the result after hitting equals is the result of the first divided by the second.
Overflow and edge case handling (5%) When any result does not fit on the display, this is handled by lighting up the middle segment on all digits. (This includes fitting the negative sign for negative numbers, or anything else that must fit)
Clear and equals handling (5%) When the equals button is pressed, the result of the two previous operations shows up. When the clear button is pressed, the stored information is completely reset.
Result transfer (5%) When an operation is completed via equals, the result can optionally be immediately used as the first operator in a new operation by following the press of the equals button with pressing an operator button.

Store current number entry