Lab 08

Code Converters

ECE 380-002

University of Alabama

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**Introduction**

One of the critical factors concerning engineers designing embedded systems is the design of the efficient interfaces to provide information to users. One of the most simple and useful methods for displaying numerical information is the 7-segement LED display. Many embedded systems incorporating clocks or timers display hours, minute, and/or seconds in this way. However, microprocessors normally request numbers internally in a binary format and 7-segemant displays are typically used to display decimal or hexadecimal digits externally, digital circuit must be developed to translate from the internal representations. In this lab, we use code converts to drive LED display.

**Procedure**

1. **Prelab**
2. Design A

In the design A, we write VHDL code for a BCD-to-seven segment LED display converter with 4 input which are representing a single decimal digit and a seven-bit output which is suitable for driving a seven segment LED display on the Altera DE1 board. Finally, we compile the file.

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1. Design B

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Description automatically generatedIn the design B, we use two 7-segment LEDs to display a 4-bit signed number in 2’s complement representation. We achieve this feature mainly through modify the previous design. We add one more digit in the output for the sign.

1. **During the lab**
2. Design A

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Description automatically generatedDuring the lab, we assign the pin of the input and output. Then we compiled the file again. Finally, we set the board. When we test the board the board change binary to decimal successfully.

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1. Design B

During the lab of design B, we repeat the same step in the design A. After we set the board, we test the number through -8 to 7. The board display the decimal number successfully.

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**Result**

The altera DE1 board display design A and B successfully.

**Conclusion**

In this lab, we understand how to display decimal number and use 2’s complement to display negative number.

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