LAB #6: Vending Machine

The purpose of this lab is to model a real life application using block diagrams and then write the VHDL code for that using only what you have learnt in the CET3136 class.

Design a circuit that can be used to control a vending machine. The circuit has five inputs: **Q**(quarters), **D**(dime), **N**(nickel), *Coin* and *Resetn*. When a coin is deposited in the machine, a coin sensing mechanism generates a pulse on the appropriate input (**Q**, **D**, or **N**). To signify the occurrence of the event (that is, the event of depositing a coin), the mechanism also generates a pulse on the line *Coin*. The circuit is reset by using the *Resetn* signal (active low). The circuit also has an Accept (**A**) output and a Reject (**R**) output that activates the Accept and Reject solenoids. After reset, the **A** signal is active. When at least 30 cents has been deposited, the circuit activates it output, **Z**. At this point, the **A** signal is turned off and the **R** signal is made active. No change is given if the amount exceeds 30 cents.

Design the required circuit by using the following components: A six bit adder, a six bit register, and any number of AND, OR, and NOT gates. Draw this out (by hand or with CAD) and submit it as part of your report for this lab.

Then write VHDL code to implement the circuit that you designed above. Use push buttons **KEY3**, **KEY1** and **KEY1** to represent inputs **Q**, **D** and **N** respectively. Use **SW0** for *Resetn* and **KEY0** to simulate the pulse for the *Coin* input. Use **LEDG0** to represent output **Z**. In addition to the design above, use **HEX3**, **HEX2** and **HEX1** display to show the number of Quarters, Dimes and Nickels deposited. Use **LEDR9** for the Accept output and **LEDR8** for the Reject output. Once the Reject output is active, any deposit of coins should not add to the coin counters shown in the HEX display. You may use any of the other LEDs for your own debug purposes.