Oregon TECH

Computer Systems Engineering Technology
CST 345—HW/SW Co-Design

HW 2 – HW/SW Co-Design Breakdown Name_____
Winter 2015 Due Date: Wednesday February 4th @ 5 pm
Instructor: Troy Scevers
Possible Points: 30

Create a custom vending machine

You are to creative a vending machine design to dispense a newspaper. You will need your vending machine to function effectively, allowing you to monitor and control your inventory (number of papers in the machine).

For simplicity, let us assume that you can place nickels, dimes, and quarters into the machine. Any combination of coins adding up to fifty cents will yield a "ready to vend" command telling the machine to vend a newspaper when selected.

We will also need to deal with change being distributed if the amount is over fifty cents. Because of existing equipment, the "change" output will need to be the actual number in eight bit binary. *For instance, if the change is supposed to be fifteen cents, we will need to output the number fifteen in binary or "00001111".*

Finally we need to deal with the product distribution. We want to only allow one paper to be distributed and we need to know when the machine is out of newspapers.

Assignment:

1. System partitioning is an integral step in embedded system co-design methodology. Assignment of an operation to software or hardware determines the delay in that operation. Efficient design of an embedded system entails optimization of this division of labor between software and hardware. Consider the design of a newspaper vending machine.

   (a) Draw a block diagram and describe the functional behavior of each block.

   (b) Draw a top-level Data Flow and Control Flow (State Flow) diagram for the specification model of your newspaper vending machine system.

(c) Explain if and how your specification model captures any of the following characteristics of embedded systems:

- Concurrency
- Hierarchy (can be done in a diagram)
- State transitions (can be done in a diagram)
- Communication
- Synchronization