

ECE 571
Spring 2015
Homework 4

Design and implement in SystemVerilog a finite state machine to implement the control logic for a mass transit ticket vending machine. The state machine should be implemented as a one-hot Moore machine and utilize SystemVerilog constructs wherever reasonable.

The vending machine dispenses transit tickets valid for one week of travel at a cost of \$40. The system accepts \$20 and \$10 bills (all other bills are rejected). The machine has two indicator lights: one to show that the system is ready to begin a transaction, and one to show that additional bills must be inserted to reach \$40.

The system has two inputs: Twenty and Ten which are one when a \$20 bill and a \$10 bill have been inserted respectively. Once a total of \$40 has been inserted, the machine dispenses a ticket. If more than \$40 is inserted change is returned. There are four outputs: Ready (to turn on the LED to indicate the system is ready to begin a transaction), Dispense (to dispense a ticket when \$40 has been inserted), ReturnTen returns a ten dollar bill to make change, and Bill (to turn on the LED to indicate the system is awaiting additional bills because \$40 has not yet been inserted).

Create a testbench to verify your design. Keep track of all states the FSM has been in and at the end of simulation report any states that were never entered. Demonstate that this works.

Submit:

- State transition diagram and table with states, inputs, and outputs labeled
- SystemVerilog code for your FSM
- SystemVerilog code for your testbench
- Results of running your testbench

In summary, the system has the following inputs:

| Signal | Meaning |
|--------|--|
| Ten | A ten dollar bill has been inserted |
| Twenty | A twenty dollar bill has been inserted |

The outputs are:

| Signal | Meaning |
|-----------|---|
| Ready | To turn on green ready LED |
| Bill | To turn on red LED to indicate more money is needed |
| Dispense | To dispense a ticket |
| ReturnTen | To return a ten dollar bill in change |