# Finite State Machine Design for Ticket Machine

### Chaitanya Chhichhia

Electronics and Communication Dept.

Institute of Technology, Nirma University
Ahmedabad, India
chaitanya.coding@gmail.com

Abstract—This paper considers the design of a Ticket vending machine that is based on the principles of Moore FSM. The design has 6 states and which are changed based on the input bills provided to it. The resulting states indicates whether the transaction was successful or not.

Index Terms—Finite State Machine, Ticket Vending, Verilog, Moore FSM

#### I. DESCRIPTION

A Finite state machine (FSM) is a sequential circuit that allows for the machine to be in on of the possible finite number of states based on the input and/or the current state. The FSM can be of two types based on how the states are changed-Moore FSM and Mealy FSM. Moore FSM changes state based only on the current state whereas the Mealy FSM changes state based on the current state as well as the inputs provided to the machine. This paper describes a Mealy FSM that can be used for a ticket vending machine. This machine assumes the price of ticket to be of \$40. The denominations accepted are of \$10 and \$20. The ticket is given out only if correct amount is paid using the combination of the specified denomination, else it returns all the bills without giving out the ticket.

#### II. STATE DIAGRAM

Fig. 1 shows the stated diagram of the FSM. It has 6 states and accepts the input denominations of \$10 and \$20. The aim of the design is to reach a state of DISP-to diespense a ticket, once \$40 is received. Other states are as follows RDY-indicates that system is ready to accept bills, B(\$10, \$20, \$30)-inidactes the amount received till now and RTN-is the state when the amount inserted is greater than \$40 after this state, the system automatically returns the RDY state.

## III. WAVEFORM

Fig. 2 shows the functional simulation waveform of the FSM. The design counts the amount and dispenses the ticket if the total becomes \$40. As shown in Fig. 2, the ticket is dispensed after 4 counts of \$10 obtained at each clock pulse. The system also returns to "RDY" state and becomes ready to serve the next customer. In Fig. 3 a condition when 3 counts of denomination \$10 and a single count of \$20 is inserted into the machine is shown. In this case, the total amounts to \$50 which exceeds the price of ticket and hence the machine goes in "Return" state after which it becomes ready to accept the next set of inputs.

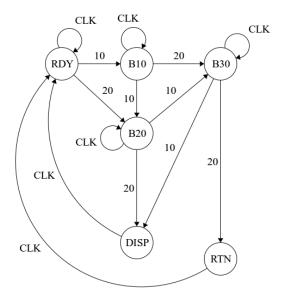


Fig. 1. State Diagram [1]

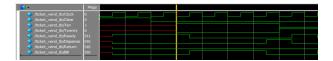


Fig. 2. Functional Simulation waveform



Fig. 3. Functional Simulation waveform (Return state)

#### REFERENCES

[1] Jenner Hanni, ticket-machine, [online] Available https://github.com/wicker/SystemVerilog-FSM/tree/master/ticket-machine

at