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Design of Vending Machine Using Verilog HDL

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ABSTRACT: The vending machine is an automated machine that dispenses various products such as snacks, beverages, newspapers, tickets etc to customers when money or credit card is inserted. Vending machines are more accessible and practical than the convention purchasing method Now, vending machine market is a big business with huge annual revenue for leading nations like The USA, Japan, China and some other Asian countries including India. The paper aims to design a vending machine that can dispense three products of different prices with additional features of 'return change' when a coin of higher denomination is inserted and 'return money' when request is cancelled. The machine accepts coins of denominations five and ten. The finite state machine (FSM) approach is adopted for the design of vending machine. The design is achieved by formulating the Verilog code for the FSM- based machine using behavioural modeling and simulating the testbench for three products using Xilinx ISE tool.

KEYWORDS: Vending Machine, Finite State Machine, Behavioural model, CAD

I. INTRODUCTION

The Vending Machine is an automatic machine that sells food such as canned soups and packaged sandwiches, snacks such as potato chips, chocolate bars, and candy); hot drinks (coffee, tea, and hot chocolate); cold drinks (juice, bottled water, soft drinks, and in some cases, milk or chocolate milk); or other items such as newspapers or tickets. The machines usually work when a product is selected and some money (usually coins or paper money) is put in a slot. Then, a button needs to be pushed, or a lever pulled. If there is enough money, the selected item will be dropped to a tray, where it can be taken out by the person making the purchase. From 2000-2010, the specialization of vending machines became more common. Vending extended increasingly into non-traditional areas like electronics, or even artwork or short stories.

Machines of this new category are generally called Automated retail kiosks. When using an automated retail machine, consumers select products, sometimes using a touch screen interface, pay for purchases using a creditor debit card and then the product is dispensed, sometimes via an internal robotic arm in the machine. The trend of specialization and proliferation of vending machines is perhaps most apparent in Japan where there is 1 vending machine for 23 people.

Apparently similar to the development of traditional mobile phones into smartphones, vending machines have also progressively, though at a much slower pace, evolved into smart vending machines. Newer technologies at a lower cost of adoption, such as the large digital touch display, internet connectivity, cameras and various types of sensors, more costeffective embedded computing power, digital signage, various advanced payment systems, and a wide range of identification technology (NFC, RFID, etc) have contributed to this development.

Integrated sensors and cameras also represent a source of such data as customer demographics, purchase trends, and other locality-specific information. It also enables better customerengagement for the brands through interactive multimedia and social media connectivity.

Smart vending machines were #79 by JWT Intelligence on its list of 100 Things to Watch in 2014. According to market research by Frost & Sullivan, global shipments of smart vending machines are forecasted to reach around 2 million units by 2018 and further to 3.6 million units by 2020 with penetration rate of 20.3 percent.

II. LITERATURE SURVEY

In recent lifestyles human require rapid processing with best quality which provides easiest lifestyle. Now-a-days, automated machines can be found everywhere in our everyday life. For example, automated machine can be found at the train stations selling train tickets. In the schools and offices automated machine provides drinks and snacks which is providing facilities to human being. And sales of goods and services via automated machine are growing strongly in India provides easiest lifestyle. Automated machine modeling is the crucial part in developing proposed model as this reduces the human resources and has been modeled using. This dissertation describes a model of an automated machine totally based on Mealy concept of FSM. The proposed model will increase the efficiency of automated machine and will also lead to cost reduction, saving time and ease of usage. The first phase involves selection of items to be purchased by consumer. In next phase, the machine generates the respective total amount required to be paid. At last the vendee enters the amount to get their products dispensed and the extra amount will be returned back by machine.

A vending machine is a self-service machine that automatically dispenses a product that the consumer selected to buy after payment has been made. This machine can be implemented and controlled by many different ways including microcontroller. In this paper, Verilog code is used to create an algorithm with the concept of Moore Finite State Machine to control the mechanism of the Vending Machine. The idea of the Moore Finite State Machine is applied to the vending machine in terms of input and output of the machine wherein the output mechanism depends only on the current state or input. In this machine, the product to be dispensed will be dependent on the input payment and selected product. The vending machine accepts payment as input and delivers the product selected by the consumer only after the amount required to buy the specific product has been made and if the amount entered to the machine is greater than the price of the product then it will give the change. In addition, this vending machine is designed to have a password required in order to gain access on the vending machine. In order to open the machine and load products into it, a 1-bit, 8- input password assigned must be correctly entered. This is to add protection to the vending machine and make it secured from unauthorized person.

II. METHODOLOGY

Vending machines which are a common thing to be seen in shopping malls or metro stations, kind of operate by themselves. It's different from other systems since it is not a distributed system used by millions of people. It is concurrently used by one person at a time and maybe used by a few thousand people a day. So we won't need features like load balancing and caching that we normally use in a system design.

Vending machine's requirements:

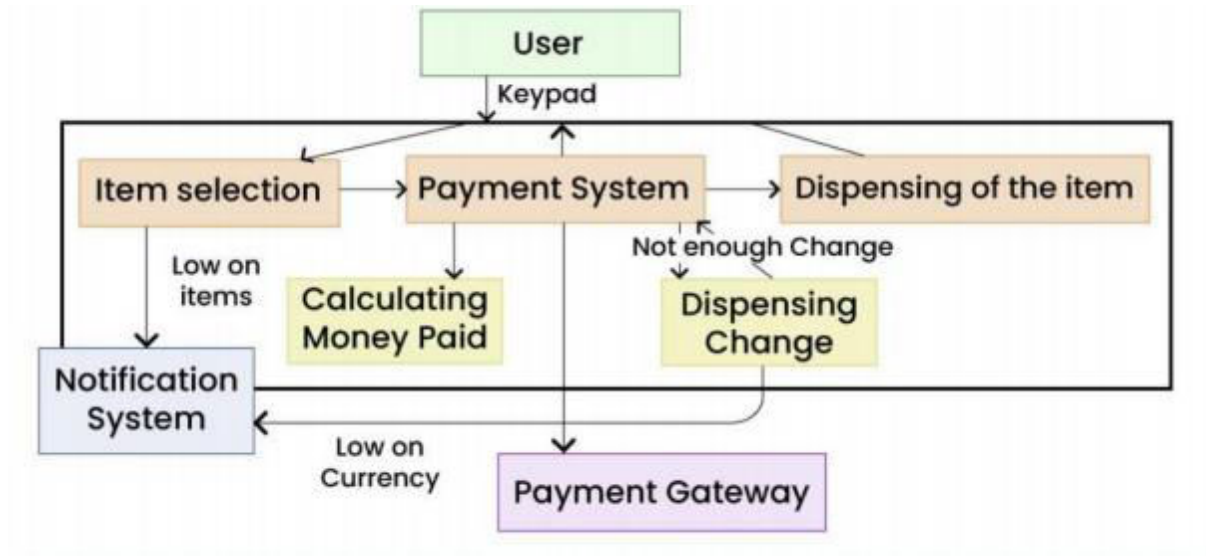
- Ability to select an item.
- Ability to pay for an item(Ask the interviewer which mode of payment they prefer. In this example, we will stick with cash payment.
- Dispense the item once payment is made.
- Notify the owner (serving agent) about inventory data. in case the vending machine runs low on any of the items, the owner can refill that item in the vending machine.

Design of Vending Machine

So in the system design diagram, on one side, we have our user. On the other hand, we have our vending machine which consists of two to three key components. We will split these components:

1) Item Selection

This component has a mapping of an item to a number so that when we select an item, it knows which item to dispense based on that mapping. We can use a hashmap for this purpose so that the selected button is mapped to the correct item. We can also store the items in a matrix format with a cards row number suggesting the button the user needs to press to get the corresponding item in that column



III. RESULT AND DISCUSSION

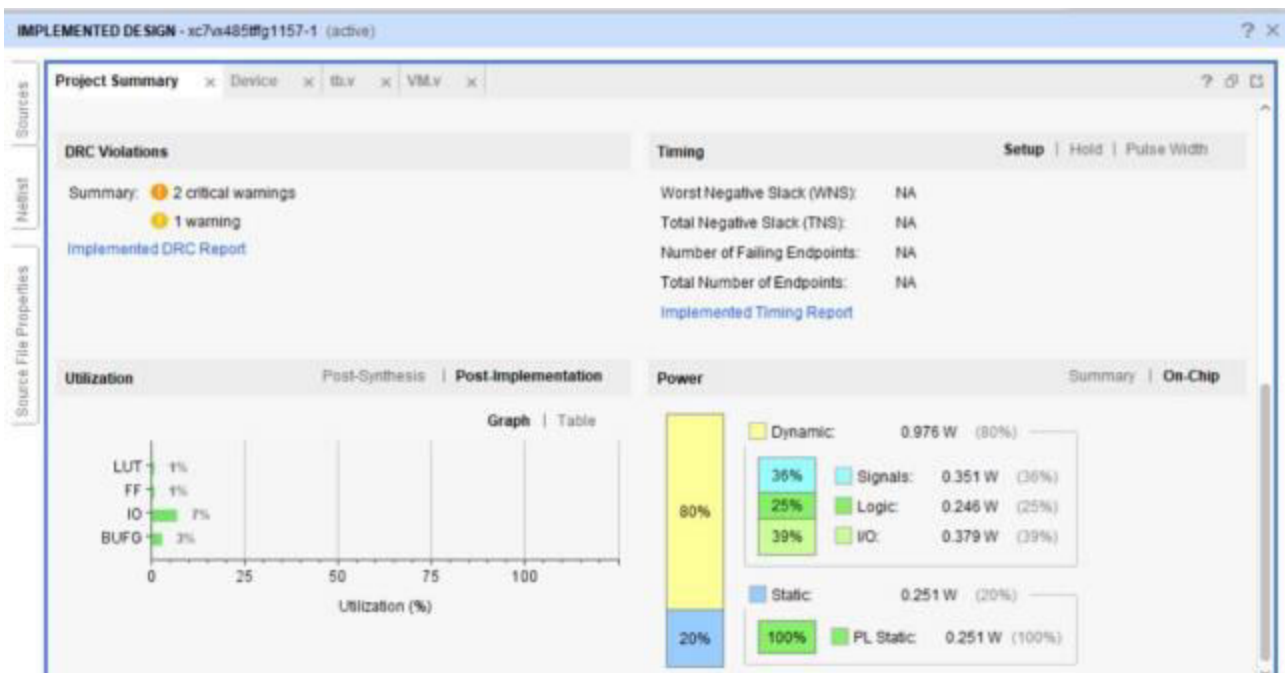


Fig. 1 Project summary

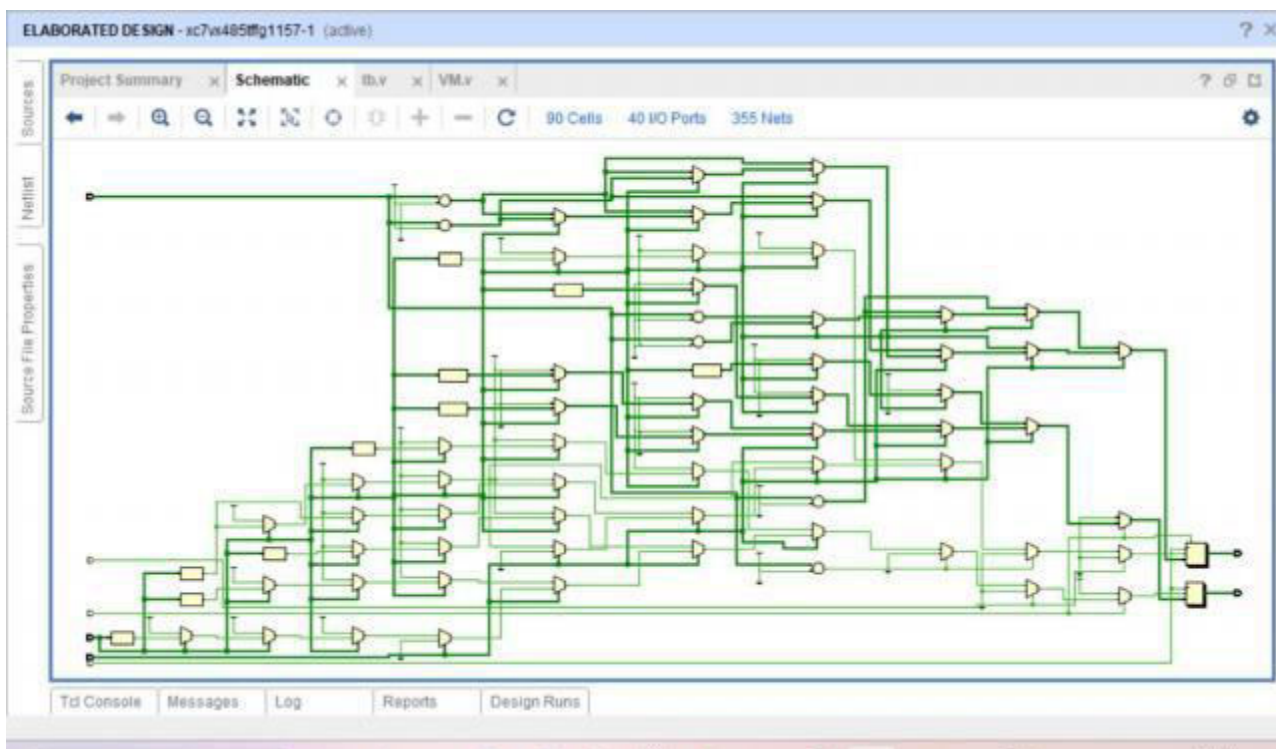


Fig. 2 Schematic Layout

In the fig 2, it shows the schematic layout of Vending meachine

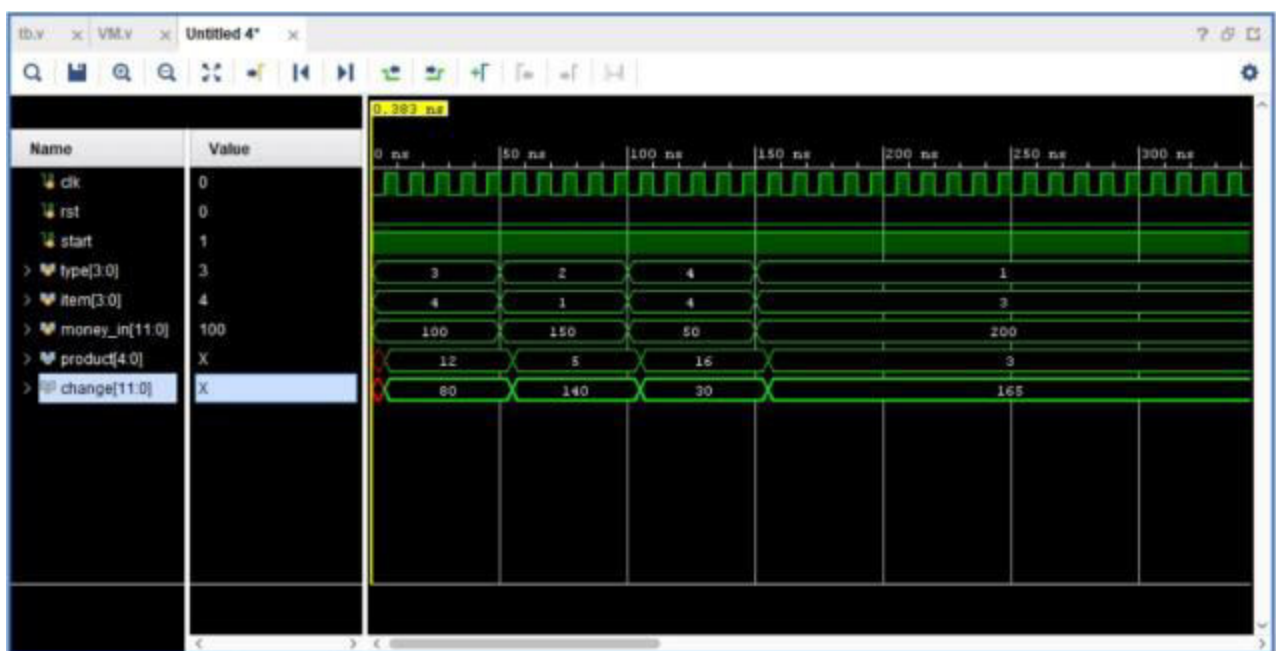


Fig .3 Output Waveforms



IV. CONCLUSION

The vending machine was successful in dispensing three products A, B and C of prices Rs.5/-, Rs.10/- and Rs-20/- respectively, with the additional features of dispensing product along with returning change when higher denomination coin is inserted and returning total money when request is cancelled. The vending machine is successful in meeting the specifications laid out prior to the design.

REFERENCES

1. R. Kiran Kumar, "FSM Based Design on the Replication of one-hot code using Verilog HDL," Global Journal of Advanced Engineering Technologies, Vol.2, Issue-3, 2013.
2. Abishek Luthra, "Design and Implementation of Vending Machine using Verilog HDL on FPGA," International Journal of Innovative Research in Science, Engineering and Technology, Vol.4, Issue- 11, November, 2015.
3. Ana Monga, Balwinder Singh, Academic and Consultancy-Services Division, Centre for Development of Advanced Computing (C-DAC), Mohali, India, "Finite State Machine based Vending Machine Controller with Auto-Billing Features," International Journal of VLSI design and Communication Systems (VLSICS), Vol.3, No.2, April 2012.
4. P. Pradeepa, T. Sudhalavanya, K. Suganthi, N. Suganthi, M.Menagadevi, Suganthi, et. al., "Design and Implementation of Vending Machine using Verilog HDL," International Journal of Advanced Engineering Technology.
5. Muhammad Ali Qureshi, Abdul Aziz, Hafiz Faiz Rasool, Muhammad Ibrahim, Usman Ghani, Hasnain Abbas, "Design and Implementation of Vending Machine using Verilog HDL," 2nd International Conference on Networking and Information Technology, IPCSIT, Vol.7, 2011.
6. Ana Monga, Balwinder Singh, "Finite State Machine based Vending Machine Controller with Auto-billing Features," International Journal of VLSI Design and Communication Systems, Vol.3, No.2, April, 2012.
7. Ashwag Alrehily, Ruquiah Fallatah, Vijey Thayanathan, "Design of Vending Machine using Finite State Machine and Visual Automata Simulator," International Journal of Computer Applications, Vol.115, No.18, April, 2015.



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