Case Study on Different Vending Machines

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Abstract - *This paper presents different beverage machines each includes unique operation like vend beverage when user will insert coin or design of vending machine depends on FSM etc. Vending Machine is a system which can vend or offer different products normally installed in supermarkets like household goods, railroad lines, offices, institutes and various other public region. Dispense different products is an automated process, without man power easy to save precious time of human normally seen in fast moving cities because of fast paced life. This paper compares different aspects or response like space, time, speed, power dissipation of a vending machine that is automated product to create our day to day life more suitable and to cover market viability.*

Key Words: Vending Machine, FSM, Human Machine Interaction, Xilinx ISE and Cadence, etc.

1.INTRODUCTION

Vending Machine (VM) is a machine which can automatically vend different products according to user demand. Vending machine is a machine which uses digital and mechanical energy or mechanisms uses actuators etc. in order to dispense items like medicines, food products, passes or licenses to users automatically means without man power on payment into slot. In most cases vending machines receive two sets of instalment, Credit/Debit Cards and Cash. Credit/Debit Card attributes require to be seized for sales along credit cards. Coffee vending machines can be installed anywhere such as bus station, office, residential region, construction, etc. Accordingly, humankind who likes to drink coffee or tea can buy a cup of coffee or tea anywhere and anytime from them.

2. SURVEY ON DIFFERENT VENDING MACHINES

A great flavoring drink permits workers, guest and customers a bit of gratification in a overdone day. All foods, beverages and constituents offered for disposal through vending machines will be constructed, handled and developed in creations.

2.1 Influential Factors of Vending Machine to Enhance the Interaction Performance

General VM buy activity. The entire operation carried 5 steps, namely starting buy, selecting, filtering, instalment and closure. The selected particular performance solutions in each step were clarified and costumers' tasks in each selection were examined.
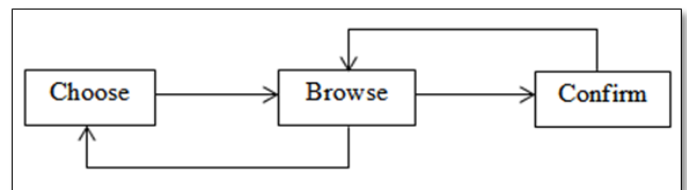

Fig. 1 : Concept of model

Vending machine interface action is mostly divided into four important steps of click, browse, confirm and return. Click, browse and confirm are the three important steps as the main important action. Phase return is considered as an coincidental performance, that is, return demands are constructed when the costumer handles incorrectly. Return is splited into two kinds: return to the previous step and return to the start sheet.

Choose - browse - (return) – establish the correctness that can be deliberated into the less time for T=a+b+c as stated by to buying operation. Buy time is being enlarged when the return performance appears.

Then the total time for the buy action can be decided as T0=a+b+c+d. They hypothesize that increase the time of buy are 2 return actions:

1. The first time to considering for the return button.

2. Returning to the start sheet, click on the return button and halting on each sheet before this one. The concept of model is shown in above figure.

It market viability with improving intellectual benefits or regulation, shortens buy time and stay away from performance defeats.

2.2 Comparison of different attributes in FSM based Vending Machine

They speak about two different set of rules for a vending machine as delineated below and then detecting out the changing speed, timing restraint, power, space demand and

usability of logic present in stratix fpga family in order to observe out more well organized and synthesizable that is covert HDL into actual component machine as for this vending machine specification.

Vending machine characteristics to be executed is related as below:

1The machine withdraws multiples of Rs10 only.

2. The machine can disburse:

>   Water: Rs 20 (Wi)

>   Snacks: Rs 20 (Si)

>   Soft Drink: Rs30 (Ci)

3. It has a Cancel key or tab (Cc)

4. Only one input may be operate at a time

5. A system can be disbursed in one complete clock cycle

6. If more than Rs 30 is put, the money is automatically that is without physical interaction the extra money come back means returned

7. If no inputs are active lively, the state system remains in same state that is in the current state.

8. Outputs: All construct a pulse that operates the deliver contraption:

>   Ro: Return out (all money in the system)

>   Wo: Water out, Co: Soft drink out

>   So: Snacks out, out10: Rs 10 out

Originally the system was in its set initial position or condition which called state A for the design reason. Given an input of Rs 10 the system design moved in its 2nd condition which was state B involved with this point the vending system is griping Rs 10 in its balance and the user has 2 selections either to reject the vending operation with the input of Cc that is cancel which is available on the system or set in another Rs 10 note in the system and go on to the next condition which is state D. Now at this period vending system assembled Rs 20 accordingly user is qualified to select options between water or snacks both of which are of Rs 20 and then go back to its inceptive condition besides beat Cc (cancel) key to finish the operation or besides set in another Rs 10 note in the machine to vend the soft drink

which prices Rs 30 so by now the user has extended state G, another Rs 10 note will be directly discarded and signal out10 goes high radiating off the additional Rs 10 out of the system from this condition user can prefer any one of the three outcomes to vend from the vending system that is soft drink (Co), water bottle (Wo) or snacks (So) or one can comparable Cc (cancel) and all money will be get back by forcing Ro signal. Total number of conditions utilized is from A to H that is 8 conditions constructing it a little redundant.

Next the same vending system with same characteristics with a little more expert or skillful way so as to reserve some space and condition demand and then observe out the wanted system is well organized or not than the foregoing space proceeding system in phrases of different essential features of a design cycle.

Differentiating two dissimilar algorithms, the key difference is under timing restriction permitting positive setup time and negative hold time. One design finding one more additional condition it is better organized in terms of timing restriction and space.

2.3 Smart Coffee Vending Machine

A smart vending system accommodates a sensor and actuator network which made up of a gateway, arising from a person's surroundings sensors, and controllers. A gateway suits an overpass between the network and an implementation managing on a smartphone that is mobile along Bluetooth. The gateway presented with some missives associated to the arising from person's surroundings conditions (for example, cleaning status) of the system from the sensors. Those missives are sent to the supplication. In inclusion, the gateway sends command missives involving the customer's predilection on the taste of coffee to the controllers.

On an approach of the verification of abstraction, they establish two magnetic sensors and three controllers. The vending system and the apparatuses established in the vending system. The magnetic sensors are established interior the system: one is connected to the substances mixer and the other is connected to the body of the system. The sensor on the body is joined to a sensor interface which conveys resolute data to the gateway. The sensors react like a switch. If the mixer is isolated from the body, an unsecured happening occurs. Otherwise, a secured happening occurs. The remoteness of the mixer is examined to be the cleaning status of the system. The substances mixer is a tool in which water, coffee, sugar and powered coffee creamer are motley to create a cup of coffee. As a much of remnant of those

substances are connected to the internal exterior of the blender, the blender should be cleaned from time to time. The blender has to be disconnected from the system while it has been washed.

Accordingly, it is supposed that the blender is wash if it is isolated from the system. By the supposition, the role of the sensors examines whether the system is washed or not for a definite time interval. With the details of data collected from the sensors, the gateway computes the constituting wave of cleaning for a particular time and regulates whether the system is clean or not. The gateway conveys these detailed data to a smart phone application when the supplication links to the gateway. The controllers adjust and manage the quantity of coffee, sugar and powered coffee creamer depending on whether to customer's predilection on the taste of coffee. The customer's predilection is collected from a smartphone supplication through the gateway. Each controller handles the gyration of a motor which regulates the quantity of each substance. The quantity of the gyration is handled in three steps: less, normal, and much.

Smart vending system which can automatically that means without man power and without physical contact with that object evaluate its own under cover situated arising from person's surrounding conditions and handle the quantity of coffee, sugar, and powered coffee creamer to create a cup of coffee depending on whether to customer's predilection on the taste of coffee. A sensor and actuator network which made up of a gateway, magnetic sensors, and controllers and a smartphone supplication depended on Android. The network and the supplication interchange some data through Bluetooth.

2.4 Automatic Beverages Vending Machine and it's performance on Cadence and Xilinx 13.1

The popular behavior of any vending favors the as a result of steps with available make different depended on the end user demands. The systems generally work, when some money is set in a time period. Then, a key or tab requires to be forced or a bar dragged. If the exact amount value is loaded into the time period of the system, the selected object will be dribbled to a flat container, where it can be drawn out by the person creating the buy.

Selection: User creates a selection of product.

Waiting for money placing: When user puts money or cash, money token allows the quantity of cash or money placed into the vending system.

Product Delivery: If accurate quantity of cash value is placed the product will be dropped and if there is any assess will quantity that will be get back to user.

Service: The vending system will request for service if the product is not able to be used in the system.
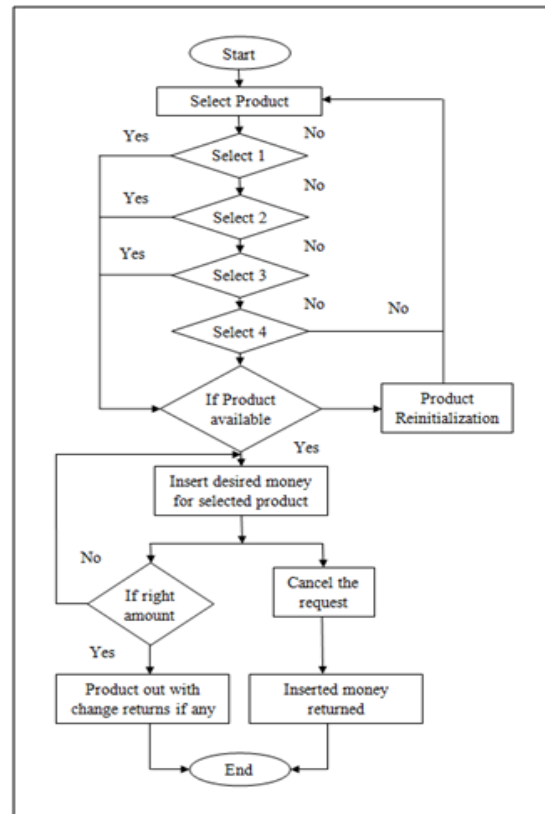

Fig. 2 : Flowchart for Vending machine

This same design they executed or contrivance on xlinix 13.1 and cadence so ultimately they judge regarding these execution, operating cadence permits optimized or improving efficiency related to space, power and delay.

2.5 Vending Mahine based on the short message payment

The vending system is predominantly collected of 3 parts: vending system correlated interact with system (containing vending system interface plate, monolithic integrated circuit and GPRS module), GPRS communication networks which are containing mobile diverting middle of GPRS base station controller, GPRS service support node as well as GPRS backbone networks etc. and the control center. The vending system communication interface module is predominantly collected with of monolithic integrated circuit and GPRS module and so on.

The monolithic integrated circuit obtains vending system's condition or position information via the Multi drop bus (MDB) protocol, reserves it to the burn and then sealants the user datagram protocol (UDP) data packet depending on whether to the user datagram protocol (UDP) agreement's message data, seals the IP data newspaper in addition to the IP highest part, and then seals the point to point protocol (PPP) frame depending on whether to the point to point protocol (PPP) frame's form, broadcast it to the managing main center through the GPRS module by the IP protocol, assembles communication between monolithic integrated circuit and GPRS module via PPP.

The user first sends the information data to the guest facility managing center and then the buying or selling from user center sends back the information frame to the user and the vending system GSM module. The user inputs the information data frame on the vending system and then the automatic managing vending system handles the information data frame to send the managing instructions automatically. The information data frame which the GSM module accepts is transferred to the buying and selling action of user center to assemble the last information data processing.

The short message payment by acquiring M68HC11 and MC35 and construct it have the task of the short message shopping and assemble it simple to use and handle.

3. EXAMPLE OF IMPLEMENTATION OF VENDING MACHINE USING XILINX 14.2

Vending system that sells soda canes that costs are a 20 each. Additionally system has only 3 types of coins: 10, 20 and 50. System purpose is to design a state machine with different conditions that regulates when to disburses a cane, how to get back the change.

In this design cane pay no attention to the volume of the storage, which means, it will suppose that there will ever be cane in the vending system. Also, suppose that only one operation could be created in every "clock cycle" or position.

Understanding the possibilities :
There are quite few options:
1) invading no money
2) placing 10 reproduced by another 10 => acquiring the can
3) placing 10 reproduced by 20 => accepting modification => acquiring a cane
4) placing 10 reproduced by 50 => accepting modification

=> getting a cane
5) placing 20 and acquiring the cane
6) placing 50 => accepting change => acquiring a cane.

State Diagram:
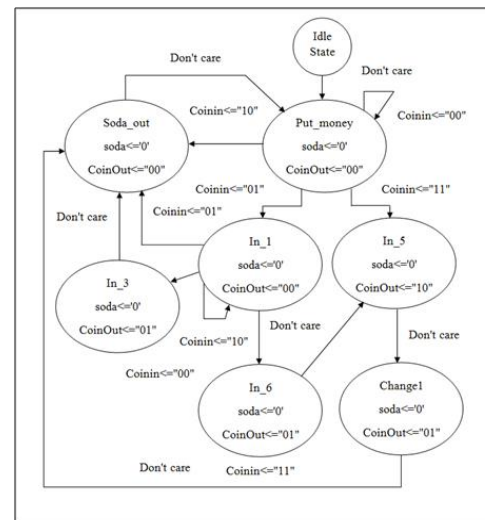

Fig. 3 : State Diagram

Explaining the states:
1) **put_money:** this is the first condition after idle condition; here the user sets in the coins.
2) **in_5:** If the user place 50, the system proceed to this condition. Pay attention that the machine gives back a 20 change without disbursing the cane yet.

3) **change_1:** after providing a 20 change for the user who paid 50 they require to get back another 10 change. Here, in this condition they do absolutely that. Again, note that the cane still has not been disbursed yet.
4) **in_1, in_3, in_6:** acquire to those conditions be controlled on the sum of money that been entered by the user.
5) **soda_out:** disbursing out the soda cane.
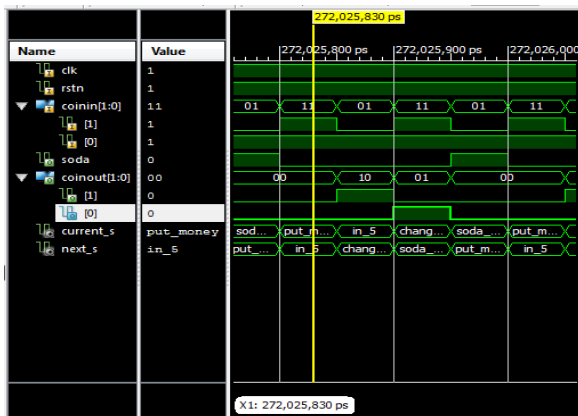
Simulation Result:

Fig. 4 :Waveforms gives detailed information about system

4. CONCLUSIONS

Compared different vending machines and all are designed with different aspects like area, power and delay because of time, switching speed, etc. In smart coffee vending machine is more optimized system with customer preferences. Because according to customer choice they can also select amount to prepare coffee or tea. This is optimized system with some aspects which are power, area and time. Also explain with one example of dispensing soda according to inserted coin to cover market feasibility.

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