

Mechanized Coffee Trading Machine Via SELEC PLC

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Abstract—The basic idea of this paper is to create simulation of an “Mechanized Coffee Trading Machine via Selec PLC”. Beverages like Tea and Coffee have become a part of a daily routine of people around the world. Employees at an MNC or a relatively small industry, everyone wants to have a cup of their favorite beverage daily. While an MNC can afford to have beverages ordered from their high-end canteens, but small offices cannot. Small offices depend on a wayside stall to fulfill their beverage requirements. Tea and Coffee from these wayside stalls may lack of quality. The water used in these beverages could be from any tap, affecting its quality. The cleanliness of utensils used in making these beverages cannot be trusted.

Virtually it is not viable to consider the individual preferences, at its site. As individual preference may different like sugar free, strong coffee, mild tea etc., for the beverage. And the time required for the beverage to deliver to the customer is also crucial. In places like offices, work sites etc., otherwise it takes 10-15 minutes. Tea and coffee trading machines using PLC can solve this problem. However, tea and coffee vending machines available in the present-day markets are expensive and bulky. As such, small offices cannot afford such machines, so our project outcome meets the requirement.

Keywords—Agitator; Heater; PLC module; Sensors; Timers.

I. INTRODUCTION

The coffee trading machine is a vending machine that distributes hot coffee and other coffee beverages. Older models used instant coffee or concentrated liquid coffee and hot or boiling water, Some of the machines, particularly utilize powdered instant coffee mixed with hot water and provided condiments such as cream and sugar. Some modern machines prepare various coffee styles such as mochas and lattes and use ground drip coffee, and some fresh-grind the coffee to order using a grinder in the machine.[1][2]

Some newer models fresh-brew the coffee using hot water and ground coffee beans, and some also grind the coffee to order using coffee grinders installed in the machines, as well as providing various condiments. Some modern machines also provide other hot drinks such as tea, espresso, lattes, cappuccinos, mochas and hot chocolate. Some of the machines dispense canned coffee, and some dispense both hot coffee and iced coffee.[2]

Public coffee vending machines typically require payment, functioning as coin-operated machines. Some do not require

payment; these are typically found at places of employment, whereby the company furnishes the beverage to employees free of charge. Machines that didn't purvey Strong, Normal, Light, and Sugar free coffee, it delivers only any one type of beverage.[3]

II. PROPOSED SYSTEM

To overcome above stated problems, we propose a Mechanized Coffee Trading Machine powered by PLC hardware, in this thesis we are demonstrating our proposed system in Selpro simulator which are used to run all the Selec PLC hardware's. In this project we propose a single unit machine compared to many unit's machine (i.e. sugar free, light, strong, and normal) in the existing system. Even the coffee vending process is automated, it means the machine takes the customer requirement and waits for few seconds in off state until coffee drops into the cup, and the machine then it goes to the on state. It avoids any double coins and help in fast tracking of the vending process. This is not just what this machine can do, but it can also perform counting of the coffee cups. Apart from this we have programmed the machine to prepare coffee as customer requirements. The above all stated functions are done and will demonstrate on Selpro software.

III. BLOCK DIAGRAM

Fig. 1 shows that a simplified block diagram of a Trading machine. It has four major units/sections. I/O (Input/output) Modules, CPU (Central Processing Units), Push Buttons, Programmer/Monitor.

The input section converts the field signals supplied by input devices/sensors to logic-level signals that the PLC's CPU can read. The Processor Section reads these inputs, Processes the signal, and prepares the output signals. The output section converts the logic level output signals coming from processor section to high level signals and used to actuate various output field devices. The programmer/monitor is used to enter the user's program into memory and to monitor the execution of program.

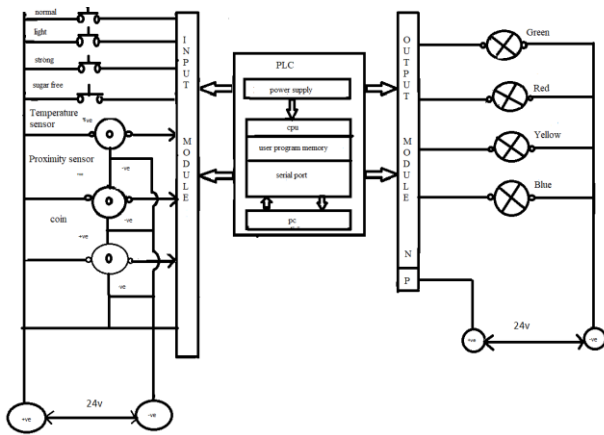


Fig.1 Block Diagram of Trading Machine.

IV. CONTROL DIAGRAM

Fig. 2 shows a control diagram usually gives information about the relative position and arrangement of devices and terminals on the devices. to help in building or servicing the device. one of the terminals of the push buttons (input) is connected to the PLC and other one to the 24V. Outputs (LED) can be seen through the output side of the PLC. Required voltage is given to PLC with the help of SMPS. PLC requires 24v DC to program.

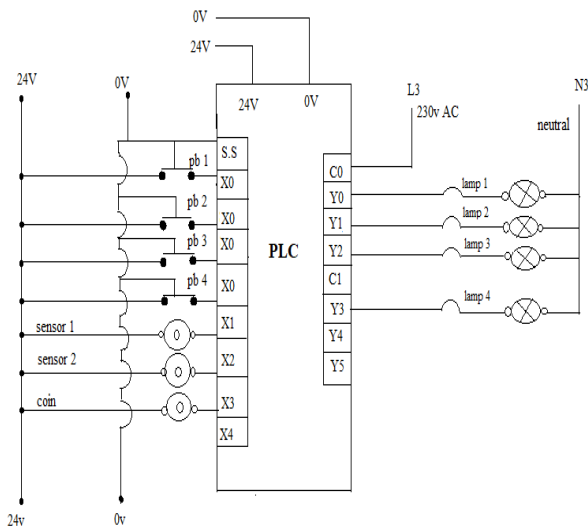


Fig. 2 Control diagram of Coffee Trading Machine.

V. WORKING METHODOLOGY

When main power supply for the Coffee Trading machine then green lamp (LED) glows for indication for the machine is ready. When coin insert into the machine it reads and take the decision for continue or not, if not the coin comes out, if continue the process will start then the red lamp (LED) will glows for entire completion of process. Next select the beverage like strong, sugar free, light, and normal options are there on the panel board. Then the process will turns into the next process. Milk, coffee powder and sugar are added into the bowl, then the agitator is start mixing operation and heater is start heating process. After mixing of coffee the agitator is turn

off and heater is continuing for detection of temperature sensor, then yellow lamp (LED) is on, this lamp indicates for ready to deliver the coffee. When cup placed bottom of the vending machine the proximity sensor is detect and the solenoid valve is open coffee pouring into the cup at the same time blue lamp (LED) is on. After completion of pouring of coffee, the process will reset automatically the red lamp (LED) is off and green lamp (LED) is on.

VI. ALGORITHM

- Step 1: Start the machine by selecting the main switch then green LED will be on, it indicates that machine is ready to start.
- Step 2: Insert the coin into the machine when green LED is on.
- Step 3: If the fixed amount is detected (when green LED off red LED will be on) then the process will be move to next step if not return to step 2.
- Step 4: When red LED is on select beverages like (normal, sugar free, light and strong) then move to the next step if not wait for the input.
- Step 5: Milk is added.
- Step 6: Agitator and heater will on, after some time agitator will off.
- Step 7: If detects the pre-set temperature then the heater will turn off then yellow LED will be on for the indication of ready to serve the coffee
- Step 8: when Yellow LED will be on then the cup placed at the bottom of the valve.
- Step 9: The proximity sensor detects the cup then after few seconds the valve will be opened then the coffee is poured into the cup.
- Step 10: when the coffee filling process is completed After few second it goes to reset position.
- Step 11: Again, the machine is ready to start.

VII. RESULTS

Fig. 3 shows that start the machine using main switch (M S) and green led will glow indication for machine ready to deliver the coffee.

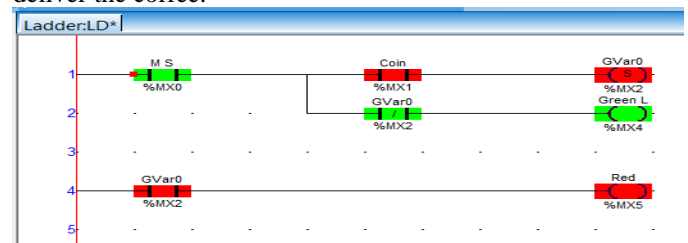


Fig. 3 Start the machine using Main Switch.

Fig. 4 shows that main input Coin insert to the machine. And red led will glow indication for machine processing.

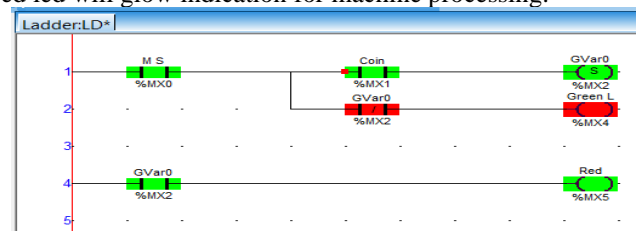


Fig. 4 Insert the Coin.

Fig. 5 shows that selection of the beverage category.

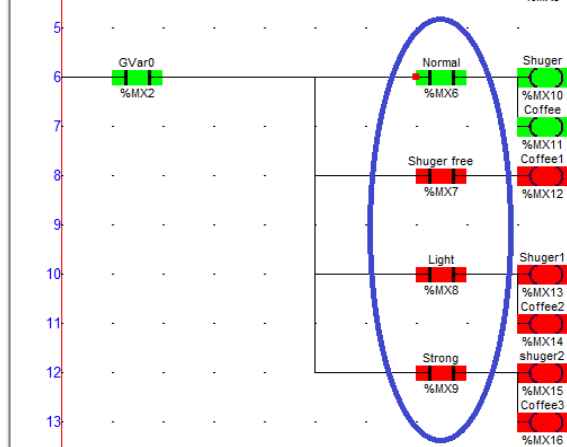


Fig. 5 Selection of Beverage.

Fig. 6 shows that milk adding to the coffee.

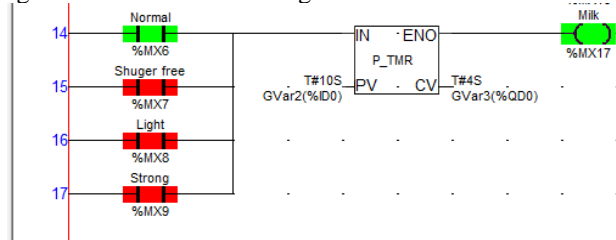


Fig. 6 Adding of Milk.

Fig. 7 shows that agitator ON for some time and also heater ON.

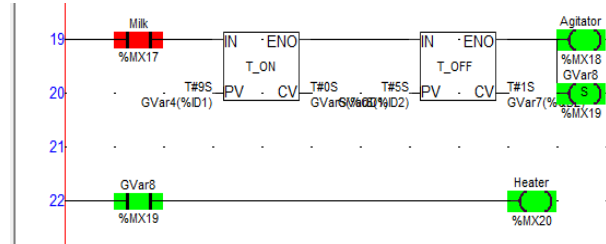


Fig. 7 Agitator and Heater on.

Fig. 8 shows that when the temperature sensor detects then the heater will OFF and yellow led will glow indication for coffee ready to deliver through main valve.

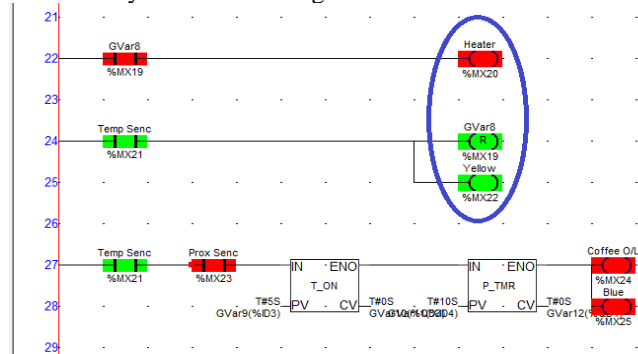


Fig. 8 Detection of sensor.

Fig. 9 shows that place the coffee cup at the bottom of the main valve, proximity sensor will detect and after few

seconds coffee comes from the main valve and also blue led will glow.

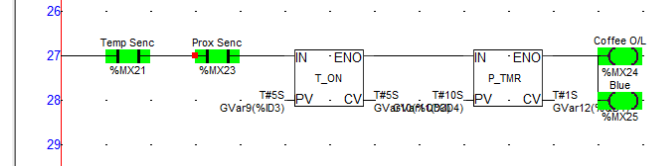


Fig. 9 Detection of proximity sensor and valve operation.

Fig. 10 shows that completion of pouring of Coffee then the machine is going to reset.

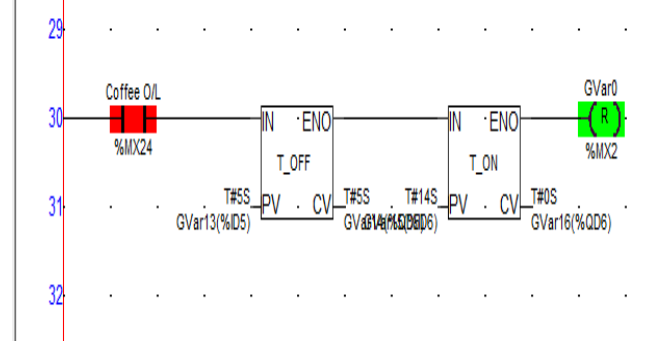


Fig. 10 Reset operation.

Fig. 11 shows the machine ready to again.

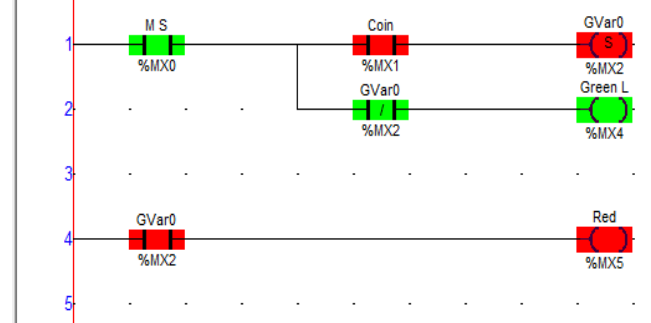


Fig. 11 completion of reset.

VIII. CONCLUSION

This paper is in-tented to automatize the coffee Trading machine, the projected system is simulated in PLC ladder environment. Mechanized coffee Trading Machine, do the process of coffee making by selecting the ranges like normal, light, strong, and sugar free. The worth of this technique are little preparation time, requires lesser extent of efforts and even more Hygienic. The activity is programmed on SELEC PLC and the PLC simulator used SELPRO software, scrutiny for all the attributes has been proved and the output has been successfully demonstrated in this paper. This ensures the present-day world's essentials. Further it can be extended to the choice of more beverages.

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BIOGRAPHIES



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