
Implementation of PLC Controlled Juice Machine

Mr. Shivaji V.Warankar

NBN Sinhgad School of Engineering

Mr. Jayesh B.Patil

NBN Sinhgad School of Engineering

Prof. Omkar M.Shete

NBN Sinhgad School of Engineering

ABSTRACT

In this world of technology, vending machine plays an important role in providing instant beverages. The operation of vending machine is time consuming with many drawbacks, such as juice quality, hygiene issues and man power. The main objective of the project is to automate the process of making fruit juices or milkshakes from flesh pulp. The quality of the juice or milkshake is a major issue that we consider when making the project. We also use PLC as controller to control operations of vending machine. The goal of our project is to manufacture fully automated juicer with the help of PLC in different modes. Different modes include normal mode and party mode. In normal mode, the machine accepts coin of Rs. 5 and gives a half glass of juice or milkshake and when accepts coin of Rs. 10, it gives a full glass of juice or milkshake. In party mode, it just fills the glass & gives a glass full of juice or milkshake without asking for money.

KEYWORDS

PLC, Coin Acceptor, Solenoid valve, Flow Sensor, Fully Automatic, RSVIEW32, RSLOGIX500

INTRODUCTION

During this industrialization vending machines play an important role for fulfilling the process immediate needs of the society. In a challenge to competitive industrial world, a system must be flexible, efficient and cost effective; so automation in machines is very much essential. The concept of automation is so versatile that it can bring radical development in almost every field. New beverages are increasing day by day in the market, so this project provides the method of preparation of soft drinks, the different juices and milk shake with the different mode. Juices are like Fanta and Maaza and milk shake and combustion of juice and milk shake in a new approach by implementing automation using PLC. The project also involves the two different mode that are, first mode is normal mode in which it accepts the 5rs coin and gives half filled glass of juice or milk shake or it accept the 10rs coin and give completely filled glass of juice or milk shake. And second mode is Party mode in this mode it just sense the glass & gives completely filled glass of juice or milk shake. The main and most important part is PLC because if we required any change then just by changing the PLC programming whole problem is solve no need to purchasing a new machine. The objective of this project is to encourage small scale industries for the implementation of automation in beverage preparation may be home or in the medium size shops.

OBJECTIVE

The objective of our project is to make fully automatic juicer machine with the help of PLC along with different mode. The different modes are like, first mode is normal mode in which it accepts the Rs. 5 coin and gives half filled glass of juice or milk shake or it accept the Rs. 10 coin and give completely filled glass of juice or milk shake. Second mode is Party mode in this mode it just sense the glass & gives completely filled glass of juice or milk shake. Also we want to make a machine it should be cheap & user friendly

MODES OF OPERATION

Normal mode

In this mode the machine recognizes coin and accordingly gives a juice or milkshakes.

Part A:-

In this mode, we must first choose a type of swing, ie a juice or milkshake and then we must insert Rs. 5 coin and finally we get half a glass of juice or milkshake. When we insert the coin into the coin acceptor machine,

it senses the coin first and generates a signal accordingly. Based on this signal, the PLC ladder diagram will be selected. For example, if we insert a coin of Rs.5, the PLC will select the amount of milk, water, sugar and pulp based on the signal produced by the Rs.5 coin. The PLC provides various signals to various devices, such as pump motors, solenoid valves, and flow sensors that operate for a specific period of time. After that, various contents such as pulp, milk, sugar and water are gathered in a container called a mixing container. The function of the stirring vessel is to uniformly mix all the contents present in the mixing container. For this operation, a stirring motor having about 100 to 150 RPM is used and operated for about 10 to 15 seconds. After that, the solenoid valve runs for a while and all the contents of the mixing container enter the glass.

Part B :-

In this mode, we must first choose a type of swing, ie a juice or milkshake and then we must insert Rs. 10 coin and finally we get a glass of juice or milkshake. The same operation will be performed as mentioned in part A, but the amount of various materials will be selected according to the quantity determined for Rs. 10 coins.

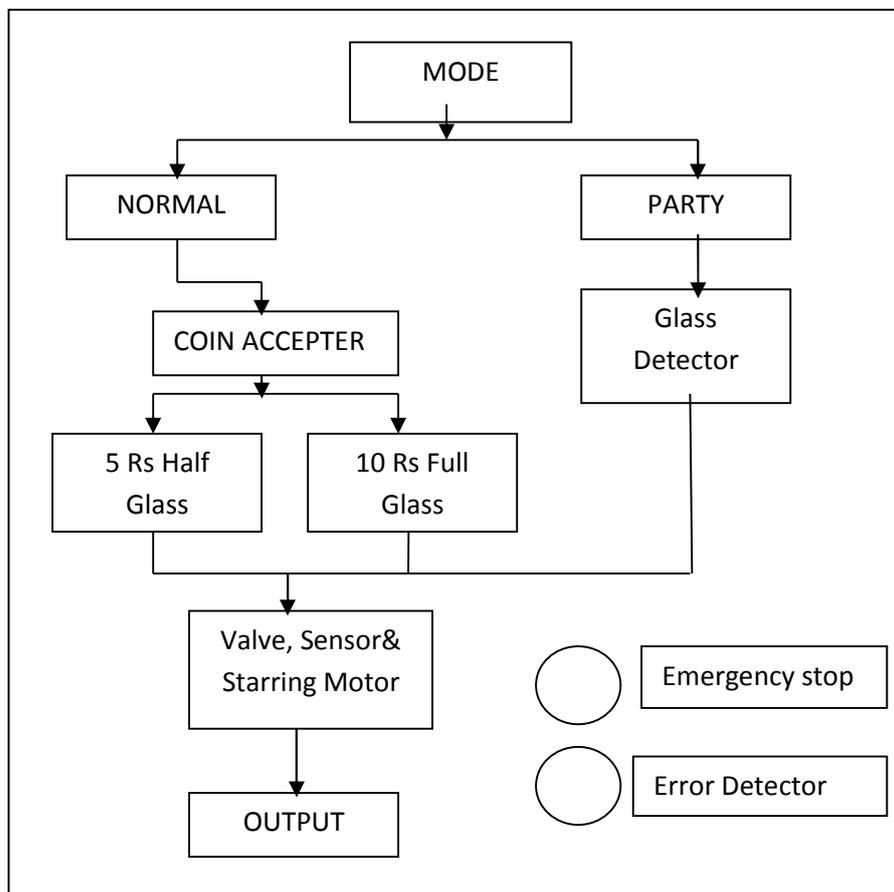


Fig1– Blockdiagram of Modes of operation

For Party Mode

In this mode only one juice/milkshake is available and there is no need of any command. The function of this mode is that sensor just senses a glass and as per programming PLC gives command and we get fullyfilled glass of juice or milkshake

ALGORITHM

Step 1 :Select the product juice or milkshake

Step 2 :Select normal or party mode

Step 3A :If normal mode,

- Accept coin
- Coin acceptor machine will sense & generate the pulses according to the coin
- The PLC will recognize the pulse and correspondingly will control the amount of material by using a flow sensor, a solenoid valve, a pump that causes juice or milkshake

Step 3B :If party mode,

- The infrared sensor will sense the glass and will add a fixed amount of material to prepare the juice or milkshake.

Step 4 :All items will get mixed using stirring motor in mixing container.

Step 5 :The solenoid valve will open to fill the glass.

WORKING PRINCIPLE

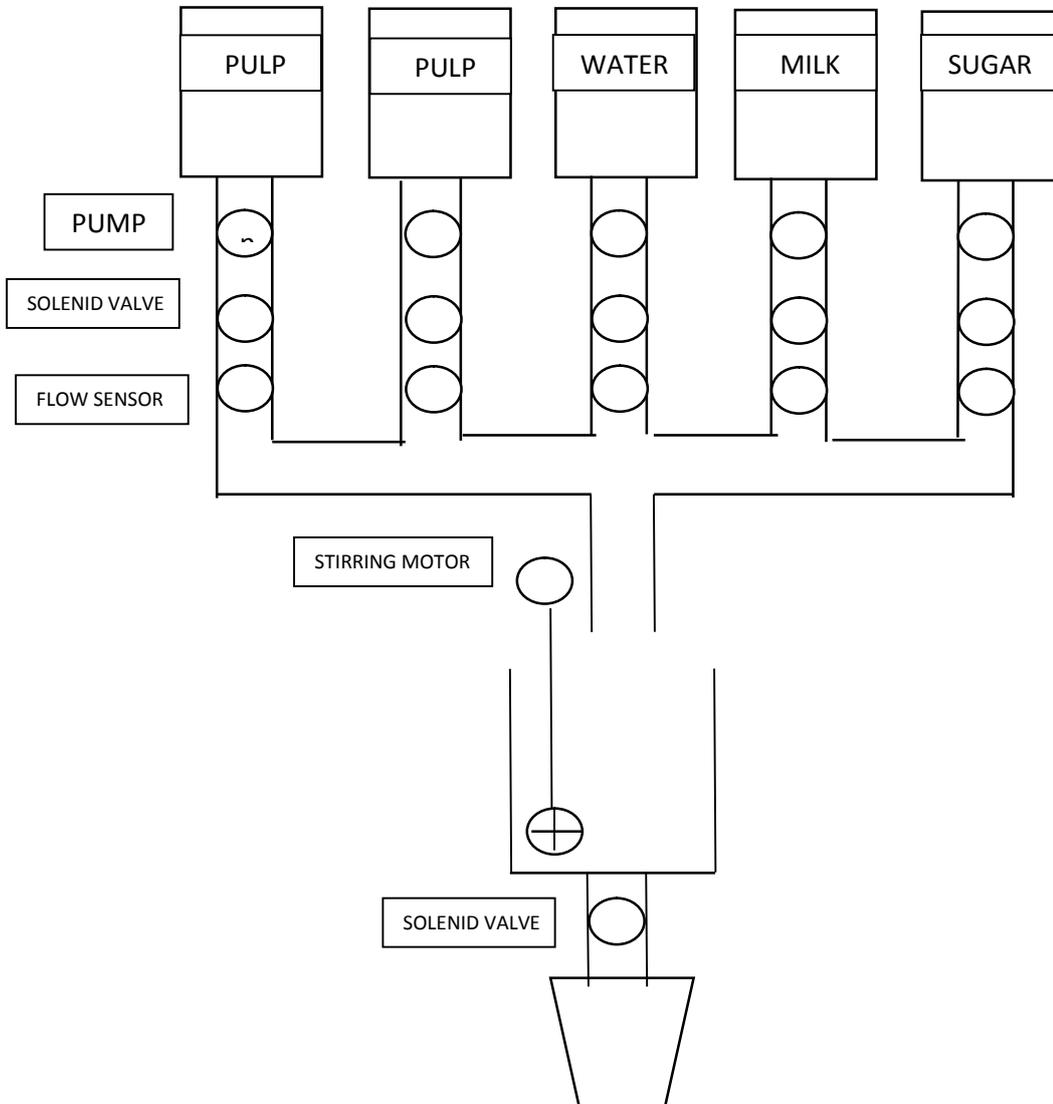


Fig 8 Experimental Set up

When we select the milkshake option, the selected pulp, the milk and sugar are gathered together in a mixing vessel with a stirring motor. All the containers are uniformly mixed for a few seconds according to the program written in the PLC and then the solenoid valve is opened. Filling option takes place finally. In the case of juice, the selected pulp, water, sugar enters the mixing vessel and the same operation takes place as mentioned in the milkshake program. When any pulp, water, sugar or milk gets over, the error detector signal will alarm. In the event of an emergency, we used an emergency stop switch to stop the entire process.

In order to implement the entire project, various components were used. Just as we have used a coin acceptor for coins of Rs.5 & Rs. 10. In the beginning, the coin acceptor will sample the coin and store the signal in memory. Then in operation, it simply matches the sample of coins we put in the machine with the samples in memory and senses the coins. The general specification of the coin acceptor is a working voltage of 12V and a maximum operating current of 450mA. The solenoid valve controls the liquid flow. DC motors are used to maintain a constant flow of liquid. The stirring motor is used to mix a mixture of various materials. In addition, we have used flow sensors to measure the liquid flow based on the Hall effect principle.

The most important part is the control of the entire project. The programmable logic controller we have used is the Allen Bradley 1400 Series B, which has 20 digital inputs, 12 digital outputs and 4 analog inputs, 2 analog outputs. For the visualization process, we used the 75-tags RS VIEW 32 SCADA.

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