PLC Based Bus Washing System

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Abstract : — Today in this present era automation is a need, Automation serves us to preserve manpower, time, as well as expense. It is significant to have smooth and effective system for vehicles cleanliness. Our report concentrates on bus washer system using PLC. Our bus washer system has three processes namely washing, cleansing and drying, Hence the external of the bus will be washed by detecting the bus and further controlled by PLC.

Car washing requires components like Circular Base for motion, Pumps to give water supply to clean, dryers, sprayers etc. Control of all these parts is made through PLC i.e. Programming Logic Control. One sensor is used to circular base, which is used to count the rotation. When you press Start button he sensor will count the rotation. On first rotation water pump will turn ON, on second rotation foam pump will turn on. On third rotation again water pump will turn on. On fourth rotation dryer or heater will turn on. And on fourth rotation buzzer will turn on which indicates that sequence is finished. In this process we are using counter of PLC.

Keywords: PLC, Motor, Relays, Switches, Shower, Cleaner, Dry Fan

I. INTRODUCTION

The first automatic car washes appeared in the late 1930s. Automatic car washes consist of tunnel-like buildings into which customers (or attendants) drive. Some car washes have their customers pay through a computerized POS (point of sale unit), also known as an "automatic cashier". The mechanism inputs the wash PLU (Price look-up codes) into a master computer or a tunnel controller automatically. When the sale is automated, after paying the car is put into a line-up often called the stack or queue. The stack moves sequentially, so the wash knows what each car purchased. After pulling up to the tunnel entrance, an attendant usually guides the customer onto the track or conveyor. At some washes, both tires will pass over a tire sensor, and the system will send several rollers. The tire sensor lets the wash know where the wheels are and how far apart they are. On other systems the employee may guide the customer on and hit a 'Send Car' button on the tunnel controller, to manually send the rollers which push the car through.

When the customer is on the conveyor, the attendant will instruct the customer to put the vehicle into neutral, release all brakes, and refrain from steering. Failure to do so can cause an accident on the conveyor. The rollers come up behind the tires, pushing the car through a detector, which measures vehicle length, allowing the controller to tailor the wash to each individual vehicle. The equipment frames, or arches, vary in number and type. A good car wash makes use of many different pieces of equipment and stages of chemical application to thoroughly clean the vehicle.

In all automobile Industries manual car washing need more labor to carry out work which effects in time consumption and also the results may or may not be satisfactory to the customer that depends. So as to overcome these issues, car washing can be done automatically using Programmable Logic Controller (PLC).

PLC is a specialized controller used for the control and operation of manufacturing process and machinery which functions using a programmable memory to store many instructions and execute functions including timing, counting, on/off control, data handling, sequencing & arithmetic. Most of the companies in industry use PLC as Updating or changes as per need in programming can be made easy as per requirement. Many electromechanical relays are observed in current existing systems which were replaced by Programming Logic Controller.

II. BLOCK DIAGRAM
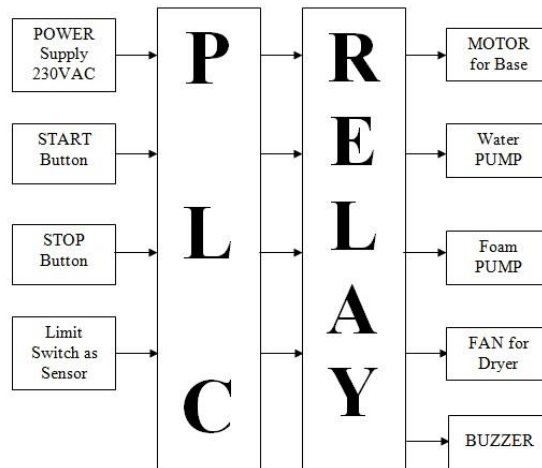
III. BLOCK DIAGRAM DESCRIPTION

PLC based Bus washing system has following blocks.
1. START Switch and STOP switch
2. Limit Switch as Sensor
3. PLC
4. Relay
5. Out Put Device
6. Power supply

1. START Switch and STOP switch:
These are normally open switch. And when pressed gives logic one i.e. 24VDC to PLC. When Car / Bus comes on the base we have to press START switch to start the operation. And when operation finished or in between washing if you want to stop the operation you have to press STOP switch.

2. Limit Switch as sensor:
This is normally open limit switch. This is used to count the rotation the base. And when rotation is detected it gives gives logic one i.e. 24VDC to PLC.

3. PLC:
These are normally open switch. And when pressed gives logic one i.e. 24VDC to PLC. When Car / Bus comes on the base we have to press START switch to start the operation. And when operation finished or in between washing if you want to stop the operation you have to press STOP switch.

4. Relay driver circuit with relays:-
This block has the potential to drive the various controlled devices. In this block mainly we are using relays. PLC gives signal to relays, which are used to control the operation of the system.

5. Output devices:
In this project we have five outputs.
1. Motor for Base
2. Pump to supply Water
3. Pump to supply foam water
4. Fan for dryer operation
5. Buzzer to indicate washing is finished.

All these devices are operating on 230Vac except Buzzer which operates at +12Vdc.

6. Power Supply:
For our project we require +24 Volt and +12 Volt supply. +24 Volt is given to PLC and +12 Volts is given to Relay driving Circuit. PLC has inbuilt power supply, which takes 230Vac as input and gives +24Vdc as output. So to get +24Vdc we have to give 230Vac as input.

For getting +12VDC we are using IC7812. The input to 7812 is output of PLC i.e.+24Vdc.
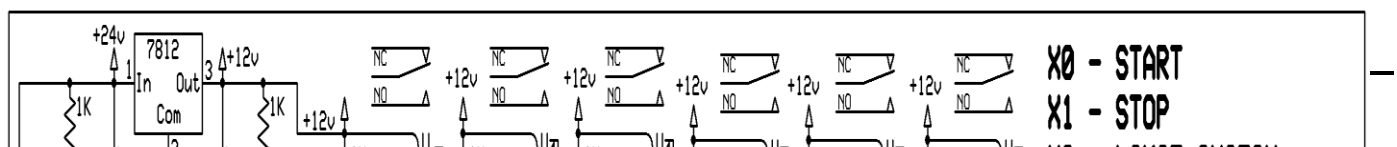
IV. CIRCUIT DIAGRAM

V. PLC Programming

Most of the PLCs available in market today use ladder logic for programming. The programming terminal or the programming software converts this ladder to machine language, which is then downloaded to the memory of the PLC.

Ladder logic is a graphical programming language based on electrical relay diagrams. As mentioned in this book earlier till the time that a PLC was invented Electrical Control was implemented by using Sequential Relay Circuits. To make a PLC more popular it was necessary that the programming language bears a close analogy to such relay circuits. Instead of having electrical rung continuity, ladder logic looks for logical rung continuity. A ladder diagram identifies each of the elements in an electromechanical circuit and represents them graphically. This allows you to see how your control circuit operates before you actually start the physical operation of your system.
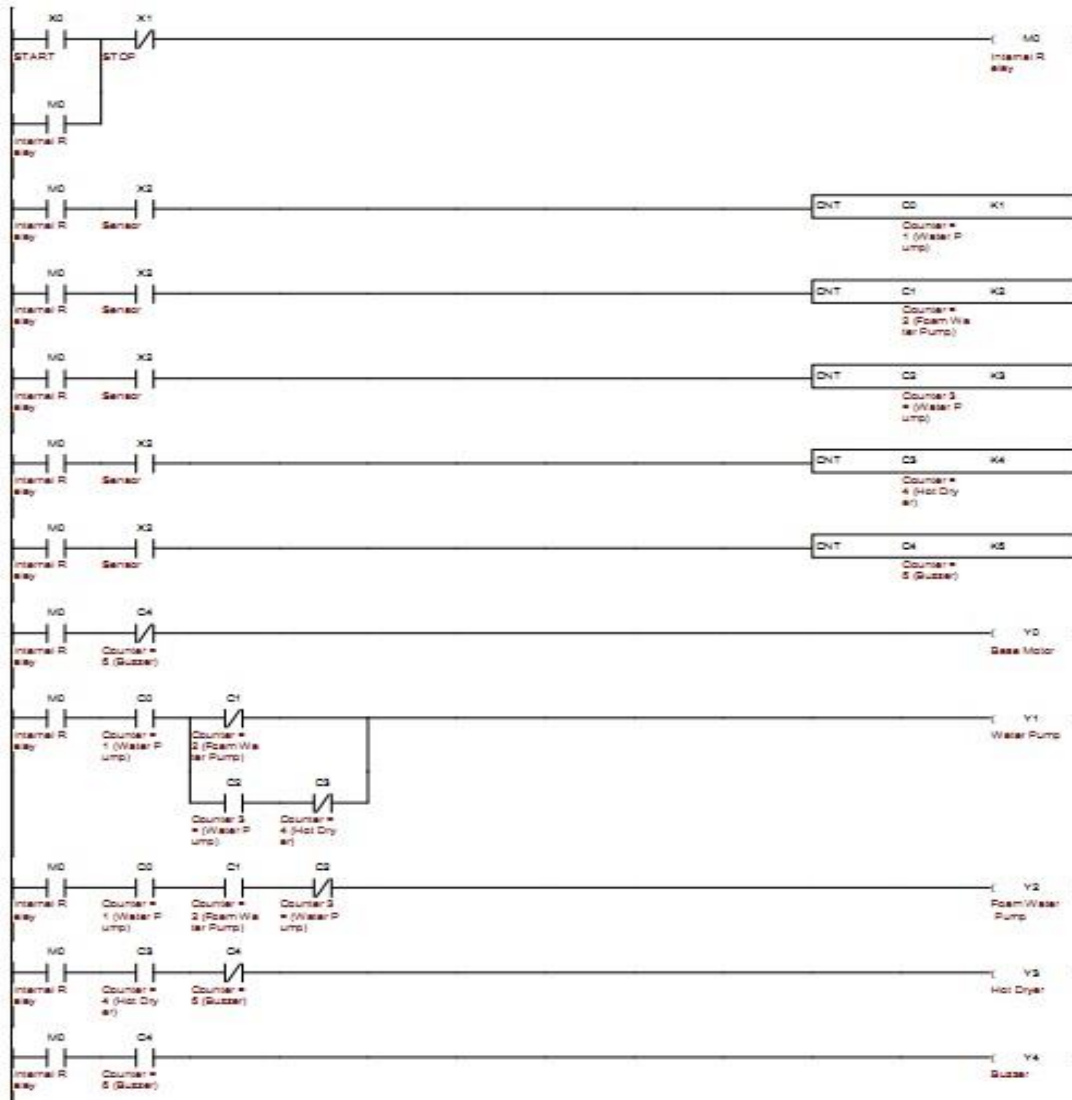
VI. APPLICATIONS

1. In car manufacturing companies. After final assembly of car.
2. In service stations.
3. Car replacing and maintaining stations.
4. Car body building industry

VII. CONCLUSION

This prototype will help to perform bus washing automatically and results in high quality end product. Thus it will be User-friendly. Also require less man power, time and no pollution.

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