PLC Based Car Washing System

Antara Deshmukh[1], Kumari Shikha[2], Tanya Jha[3], Prof. A.R.More[4]

[1,2,3] *U.G. Students, Department of Electronics and Telecommunication Engineering, RMD Sinhgad School of Engineering,Pune, Maharashtra, India*

[4]*Assistant Professor, Department of Electronics and Telecommunication Engineering, RMD Sinhgad School of Engineering, Pune, Maharashtra, India*

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

This project serves us to usage a conveyor belt on which patron stops the car. After that, inductive proximity sensor is used for detected the car, then the conveyor belt begin running. Sensor plays essential role on conveyor belt for car detection. As early as car is sensed functioning of conveyor assembly invokes. After mention delay for all activities to accomplish conveyor get suspend. The main goal of this project is perform external car wash automatically using Programmable Logic Controller. Car washer technique is assembly of different things as scatter solution of detergent, cleansing with water and brushes, & then completing work with forced air-drying fans.

Along with PLC we will be accomplish one more technique i.e. IIOT (industrial internet of things). This technology serves us to produce web pages and check the whole system through those webpages. Mainly timers and counters can be controlled through them. We can increase or decrease the delay with the help of these webpages.

Keywords: **PLC, Wiper Motor, Conveyer Belt, Brushes, Relays, Switches, Shower, Cleaner, Dry Fan, SMPS.**

I. INTRODUCTION

Car washer is single activity done in mandate to keep the external of the car clean. Mostly it is done manually in locomotive garage, this manual way of cleansing car arise in more waste of water, manpower and time. The automatic car washer system diminishes the utility of water and also manpower need. Our car washer system utilizes control using PLC. There are three procedures involved in our car washer system namely wash, cleansing and drying. Cycles of washer includes wash with detergent, and then with water.

A PLC is a controller which can control most of the machines very easily. Installing a program and setting it up is very easy in a PLC. The programs written in ladder language can be authenticated and checked before ultimate installation and also it can be edited at any time without disturbing any physical apparatus of the project. The best part of using a PLC is that it does not need any typical wiring and rewiring if some changes are made in the previously installed program. A programmable logic controller performs mainly three functions which are continuously repeated in a proper sequence. The three main functions are (1) Testing the input (2) Execution of the program (3) Updating the output. In a PLC there is a provision of input terminals for connecting the input devices and output terminals for connecting the output

II. BLOCK DIAGRAM OF CAR WASH SYSTEM

A. PLC:

PLC (Programmable Logic Controller) is commonly called as Programmable controller. It is a valid state, computerized, Industrial Computer. Upon first observe, a PLC might seem to be enclosed to a black box with wires acquiring signals and distinct wires sending signals out.
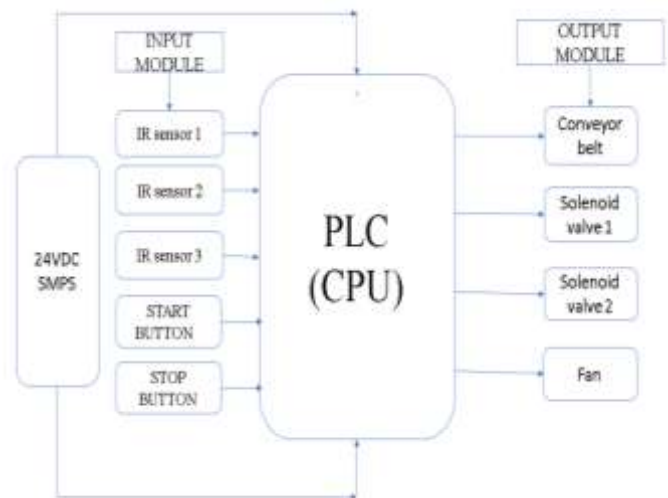

Fig. 1 Block Diagram of Car Wash System

B. Relay:

A hand-off is an electrically worked switch. Numerous transfers utilize an electromagnet to mechanically work a switch, yet other working standards are similarly utilized, for illustrate, valid state transfers. Transfers are utilized contain the transportation of substantial or weighty materials. Transport frameworks grant snappy and fruitful transportation for a distant classification of materials.
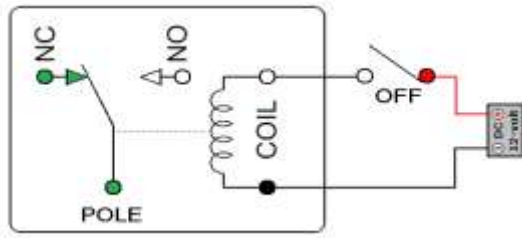
Fig. 2 Relay coil Circuit

C. Conveyor Belt:

That moves materials starting with one area then onto the next. Transports are particularly helpful in applications including the transportation of substantial or massive materials. Transport frameworks permit snappy and productive transportation for a wide assortment of materials.

In this project conveyor belt is used in order to reach car in different stages of washing.

Fig 3. Conveyor Belt

D. Solenoid Valve

A solenoid valve is an electromechanically operated valve. The valve is controlled by an electric current through a solenoid.

There are many valve sketch variations. Ordinary valves can have many passageway and liquid paths. A 2-way valve, for example, has 2 ports; if the valve is open, then the two ports are joined and liquid may flow between the ports; if the valve is closed, then ports are isolated. If the valve is open when the solenoid is not energized, then the valve is name normally open (N.O.). Similarly, if the valve is closed when the solenoid is not energized, then the valve is termed normally closed.

Fig 4. Solenoid Valve

E. Power Supply

Any system works on the electric supply and this supply is deliver from the power supply .For automatic car washing system we requires a three specified voltage supply like 5v, 12v and 24v SMPS .first 5v supply is required for relay, IR sensor and 12v power supply is used for the working of RELAY and dc motors which are driving assembly as conveyor belt, shower operation, cleaning brushes, solenoid valve and it is parallel with the small pipes used to spray the water from bottom side to clean the car from its bottom side. 24v SMPS used to operate relays of PLC as well as switches to on and of the overall system.

Fig.5. SMPS

F. IR Sensors

An infrared sensor is an electronic device which is used to sense fixed characteristics of its surroundings by either emitting and/or detecting infrared radiation. Infrared sensors are also efficient of measuring the heat being eject by an object and detecting motion.
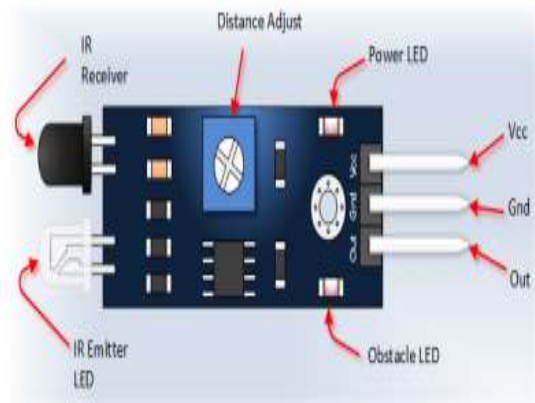

Fig. 6. IR Sensor

This sensor basically runs on 5v supply so a relay is connected in order to give that 5v signal to PLC. So, whenever a car is detected this IR sensor gives the signal to PLC hence while further application i.e., a drizzle of water and drying is done automatically.
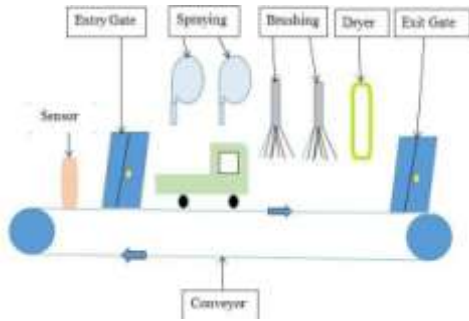
III. WORKING OF CAR WASH SYSTEM

Fig. 7. Working Flow of Car Wash System

The fig. 7shows the square graph of Automatic Car Washing System. A 230V AC Supply is given as to the SMPS for getting 24V DC, since PLC can work at 24V DC. Terminal Block is utilized for multiple inputs and yields.

A. Description:

PLC is combined with PC through Ethernet cable correspondence link for downloading or transferring the system. Transport is utilized for drifting the car through distinct phases of wash. We utilize 10 rpm DC motors for driving the conveyor through PVC pipes and gears for driving brushes. When conveyor`s portion is in strong condition and very much adjusted, it will work legitimately. The suitable clasping of car wheels on the transport is required with a precise end goal to keep aside from relocation.

By and large brushes are currently either fabric (which is not destructive to a car complete, the length of it is flushed with a lot of water to expel the coarseness from past washes), or a brush, which does not hold soil or water. Along these lines it doesn't hurt any painted completion. It gives a delicate cleaning impact to leave the paint much shinier. High weight spouts are pointed at different position for splashing cleanser arrangement and water to clean hard to achieve parts of the vehicle. Toward the end, hot steam air is for the most part utilized for drying the car. Development of this framework is relies on the prerequisite. A visual programming dialect known as the Ladder Logic was utilized to program the PLC.

IV. PLC SPECIFICATION

Fig. 8. Phoenix Contact PLC module

- Numerous protocols supported such as: HTTP, FTP, SNTP, SNMP, SMTP, SQL, MySQL, etc.
- Free engineering with PC Worx Express (IEC 61131-3)
- Complete INTERBUS master (4096 I/O points)
- FTP server
- Integrated web server for visualization with WebVisit
- Flash file system
- Programmable Logic Ladder 4K.
- Transmission speed 500kbaud/2Mbaud
- Interface by Ethernet 10-BaseT/100-Base TX
- Onboard 8 inputs and 4 outputs

V. RESULTS AND CONCLUSION

A. Result

Fig. 9. Prototype Model of PLC Based Car Wash System

Fig. 10. Working of car wash system

B. CONCLUSION

This model will execute car washer accordingly rise in the brilliant deciding item. Therefore, it will be User accommodating and expert to wash separate autos at once. Likewise demand less labor, time and no pollution. After fulfillment of the project car washer and dryer, we can conclude that such automation system is completely profitable, and preserving time of operation and also man

power diminish, improving the economy of the system the future such example of system will have more demanded, Also the system is pollution free so it is implementable in market easily, and thus from this project we can conclude that the overall working of the system plays an essential role in smart city development ideas as for the city becomes smart the system gets easier and cost efficient as well as it has long life to become and look serviceable and effective for the washing center andas well as it have long life to become and look effective and effective for the washing center and also cost effective as well as it have long life to become and look effective and efficient.

C. ADVANTAGE

1. The entire system is automatic therefore, no need of manpower. The PLC entirely works digitally, it needs only mechanical assembly.
2. Can be use in domestic service stations, as there is no compressor & number of loud noise: At the domestic workstation if no compressor is there then this will also with the no sound pollution.
3. Very less maintenance: As we uses the PLC this is more durable than other electro-mechanical system.
4. Comparatively cost of system is less: if his system is more durable then its life is also as higher and as per the consideration of life this system have cost effective then other.
5. No. more space required. No. environmental pollution: the module of PLC is very small, so it does not require large space.

D. APPLICATION

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.

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BIOGRAPHIES

Miss Antara Deshmukh, pursing her B.E in Electronics and Telecommunication from RMD Sinhgad College of Engineering, Maharashtra, India. I presented paper in INTERNATIONAL LEVEL event.

Miss Kumari Shikha, pursing her B.E in Electronics and Telecommunication from RMD Sinhgad College of Engineering, Maharashtra, India. I presented paper in INTERNATIONAL LEVEL event

Miss Tanya Jha, pursing her B.E in Electronics and Telecommunication from RMD Sinhgad College of Engineering, Maharashtra, India. I presented paper in INTERNATIONAL LEVEL event.