# AUTOMATIC CAR WASHING BY USING PLC

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## ABSTRACT

*The main objective of this project is to perform exterior car washing by using programmable logic controller. A PLC (Programmable Logic Controllers) is a digitally operating electronic apparatus which uses a programmable memory for the internal storage of instructions by implementing specific functions such as logic sequencing, timing, counting, and arithmetic to control, through digital or analog input/output modules, various types of machines or processes. PLC sends the information like entry and exit of the car and emergency conditions to the customer (or) operator through alarm. After receiving the information from the PLC, the operator can be able to act upon it. Car washing includes spraying of soap solution, cleaning with water, wiped by brushes and finished with the forced air drying.*

## 1. Introduction

Car washing is simple activity done in order to keep the exterior of the car clean. Mostly it is done manually in automobile garage or service centers of automobile companies. This manual way of cleaning car results in more consumption of water, manpower and time. The automatic car washing system explained in this paper minimizes the use of water and also manpower requirement. Our car washing system utilizes control using PLC. SCADA system will be installed on the operator panel and hence the operator can monitor and control the whole process. There are three process involved in our car washing system namely washing, cleaning and drying. Cycles of washing includes washing with water, and then with detergent. Using this automatic car washing system, many cars can be washed and it will save time, energy and manpower. Such systems can be installed anywhere such as malls, airports, railway stations, residential buildings etc.

### 1.1  Necessity-

A 230 v AC supply is given to the system (SMPS) for obtaining 24V, DC supply. PLC is connected to PC through RS-232 communication cable for running the program. The Conveyor is used for moving the car. We use 10 rpm DC motors for driving the conveyor belt and 100 rpm motor for driving brushes and fans. The car is properly placed on the conveyor belt and the motor for making the conveyor to roll on is turned on and automatically the car place on the belt will set to move. Here High pressure nozzles are placed at various position for spraying soap solution and water to clean the vehicle and the brushes are used over instead of cloth for making a gentle clean of the vehicle it does not harm any painted finish and provides a gentle polishing effect to leave the paint much shinier. And a hot air is made to be touched over the car for making the car to become dry. Construction of this system is depends upon the requirement of the user and a visual programming language known as the Ladder Logic was used to program the PLC.

### 1.2 Objectives
1. The Main Objective Of This Project Is To Perform Exterior Car Washing By Using Programmable Logic Controller. Save Time
2. Hazards Free
3. Society Life Style Changing
4. To Provide Efficient  Reliable Service

5. Utilization of Limited Man Power.
6. Not Too Complicated(Customer Friendly)
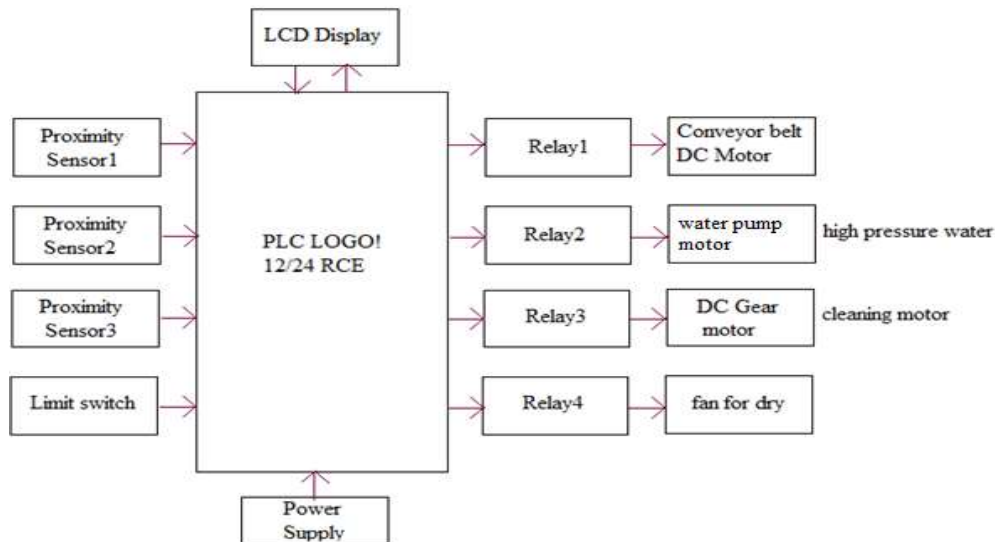7. Environment Friendly

## 2. Block Diagram



**Fig2.1. Block Diagram**

### A. Proximity Sensor

A proximity sensor is a detects the presence of nearby objects without any physical contacts by emitting electromagnetic field or a beam of electromagnetic radiation. In our project, we have used inductive type proximity sensor for detection of metal cars.

### B. PLC

**PLC** is a specialized computer used for the control and operation of manufacturing process and machinery. It uses a programmable memory to store instructions and execute functions including on/off control, timing, counting, sequencing, arithmetic, and data handling.

### C. Conveyor Belt

A conveyor system is a common piece of mechanical handling equipment. That moves materials from one location to another. Conveyors are especially useful in applications involving the transportation of heavy or bulky materials. Conveyor systems allow quick and efficient transportation for a wide variety of materials.

### D. Water pump

It is an electronically operated device. For our requirements, the two port water pump is the most suitable one. It is generally used to replace a manual valve.

### E. Motor

In a dc motor, armature rotates inside a magnetic field. The basic principle of DC motor is that whenever a current carrying conductor is placed inside a magnetic field, there will be mechanical forces experienced by the conductor. Generally all dc motors work on same principle. In our project, we are going to use 24 V DC relay. We are going to use two dc motors for moving the conveyer belt.

**2.1 Block diagram Description**

The figure shows the block diagram of Automatic Car Washing System. A 230V AC Supply is given as input to the SMPS for obtaining 24V DC, since PLC can operate at 24V DC. Terminal Block is used for multi inputs and outputs.

PLC is connected to PC through RS-232 communication cable for downloading or uploading the program. Conveyor is used for shifting the car through various stages of washing. We use 100 rpm DC motors for driving the conveyor belt via pulley and for driving brushes When conveyor`s components are in good condition and well aligned, it will operate properly. Proper clamping of car wheels on the conveyor is needed in order to avoid displacement. Generally brushes are now either cloth (which is not harmful to a cars finish, as long as it is flushed with plenty of water to remove the grit from previous washes), or a brush, which does not hold dirt or water. Thus it does not harm any painted finish. It provides a gentle polishing effect to leave the paint much shinier.
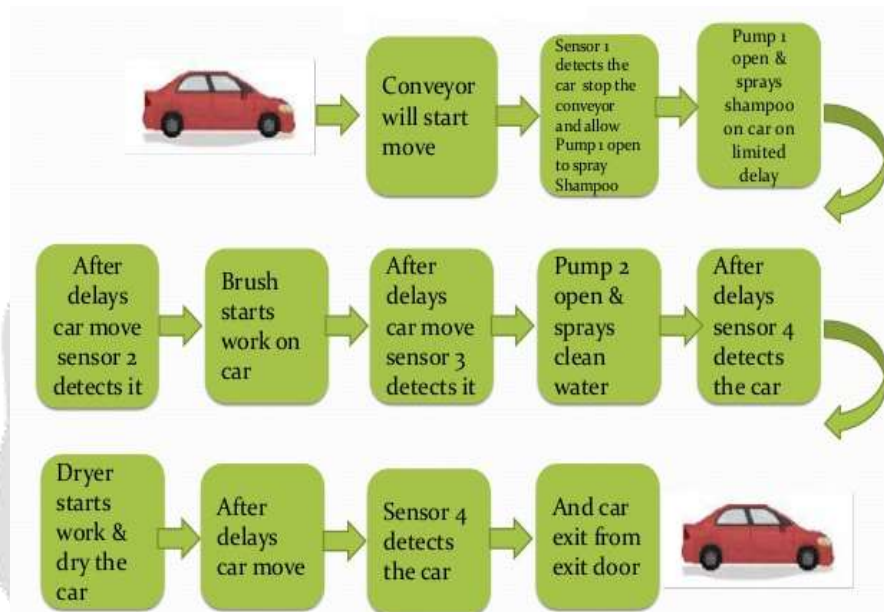


Fig.2.2- Working

High pressure nozzles are pointed at various position for spraying soap solution and water to clean difficult to reach parts of the vehicle. At the end, hot steam air is generally used for drying the car. Construction of this system is depends upon the requirement. A visual programming language known as the Ladder Logic was used to program the PLC. An Infrared sensor is used which emits radiation in order to sense presence of car at the entry level. Once the Infrared radiation is cut by the car an input signal is given to PLC. Switches are present in the HMI screen. As an input signal is received, PLC starts executing the Ladder Program.

First the conveyor moves by fixing a timer for few sec. After that, it stops at the stage of washing. In general process, Car is cleaned by spraying soap solutions; rinsing, brushing, drying, waxing, etc. depends on the requirement of customer. We have chosen spraying water, Brushing and finally drying for cleaning the car.

Each activity is carried out for a certain time period. Water is sprayed for few sec and nozzle is closed. Then four brushes rotate for few sec and stops. Now the conveyor starts moving to next stage. After few sec, it stops for drying. Two fans are used for drying the car up to few sec. Then the conveyor carrying car moves to the exit level. Again an IR sensor senses the car and sends an input signal to Programmable logic controller.

Timings are set by using timers in ladder programming. These timings can be varied depending upon the requirement.

## 3. CONCLUSIONS

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 fulfilment 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 and as 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.

## 4. FUTURE SCOPE

Using this concept in more compact and efficient way, multiple case studies for industrial applications as well as domestic can be carried out. In order to save water we can implement water recycling or purifying system to wash cars. With required systematic hardware arrangement system can be used to wash trains, Buses, trucks, etc. too.

## 5. REFERENCES

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