Design and implementation of automatic car washing system using PLC

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Abstract - *This Paper present work an Automatic car washing using a PLC. A PLC is a type of microcontroller which is a programmable logical controller. This system is already available in market based on conveyor belt. In our project we are using pressure cylinder to lift the car. Our project is prototype model in which a car enters a washing station and automatically gets clean up. We are using different components in this project such as pressure cylinder, dc motor, brushes and dryer. All the system hardware is controlled using PLC. The most important aspect of more efficient washing by using less water. For example we use 160 gallons of water, using this fundamental process 30 gallons of water is only used. A car is clean 94% using this approach.*

Key Words: Pressure, Dryer, Washing,Conveyor,proximity sensor.

1. INTRODUCTION

Automatic Car Washing is a PLC based project. Using conveyor the first car washing system was opened in USA in 1940.This system has hoist system which wasused in pull system. Now days latest advantages in science have made it possible This was the replacement of pushing to achieve great reliability and efficiency in the automatic car washing system. PLC is an automation which plays a very important role. This conveyer course is very common in industrial countries. But in the conveyer practice having drawback that we cannot clean up the downside of the car. We are using the pressure cylinder to lift the car so we can clean the downside of the car in our Project. Our project is based on cyclic process which provides more than 95%.

1.1 Positives of using PLC

A PLC is a director which can power most of the machines very straightforwardly. It is very easy to step up a program and install it. The programs written in ladder language can be confirmed and tartan before closing putting in place and also it can be abbreviated at any time without alarming any physical setup of the project. The best part is if some changes are made in the previously installed program in PLC such that it does not require any typical wiring and rewiring.

1.2 METHODOLOGY

The function of the car washing system is when the car is entered in the washing room the car is placed on the small conveyor belt. The dc motor used in conveyor belt system. The detergent water to clean the car is provided by the solenoid valve. This conveyer takes car to the lift mechanism. Lift mechanism lift the car upside where the brushing system and sprinkler system is used. Brushing system is used to clean the car and the sprinkler system is used to wash the car using Component Various types of components are used in this project: 1.1 Proximity sensor It finds the availability of nearby objects by emit EMF or a beam of electromagnetic radiation without any physical contacts. We have used inductive type in our project, proximity sensor for detection of metal cars.

1.3 PLC

PLC is a microcontroller computer used for different process such as control and operation of manufacturing process and machinery. It provide automated specific process, system function and for whole production line.

2. HARDWARE

This system deals with the automatic cleaning of the car.
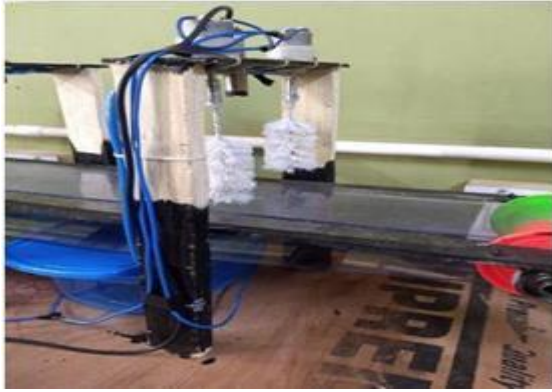

Figure1: Proposed system

The process of proposed system is described in various steps.

Step1. Vehicles enter the cleaning platform i.e; conveyor belt.
Step2.Sensor detects the vehicle.
Step3. Vehicle stops for 10 sec for step4.
Step4. Pump1 soapy water and cleaning water.

Figure2. Soap water and brushes

Step5. Vehicles remain stop for 5 sec more for Step6.

Step6.Brushes rinses car.

Step7.Conveyor start moving.

Step8.The vehicle again stop for 10 sec and cleaning water spreader all over it.

Figure3: Clean water

Step9. After that conveyor starts moving.

Step10.It stops again for 10sec for fan to drying the car.

Figure4. Fan for drying

3. SOFTWARE

The software used is "DELTA PLC".

3.1 PLC Programming

Table 1: Input output function

Input	Output
X2 for sensor1 to detect the car. 15 sec delay provided 10 for soapy water and 5sec for brushes.	Y1
X0 for sensor2 to detect the car and for clean water (delay of 10 sec)	Y2
X3 for sensor3 to detect the car for drying it(delay of 10 sec)	Y3

4. EXPERIMENTATION

The downside of the car was get rust by mud in rainy season. we cannot clean the downside of the car in the conveyor belt process. So in this project we are using the pressure cylinder to lift the car so we can clean the downside of the car. Given below the block diagram of our project in which we provide the 10-15 sec delay with the plc timer. Then two brushes rotate and side by side soap water is also sprayed on the car for 10 sec and stops. Now the conveyor starts moving to next stage. In the next stage car is lifted by pressure cylinder where downside of the car is being cleaned with both soap water and then with clean water. After few sec, it stops for drying. A fan is used for drying the car up to 30 sec. After few sec, it stops for drying. A fan is used for drying the car up to 30 sec.
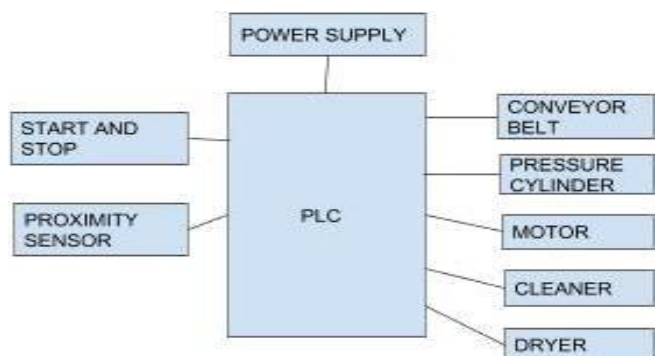
5. RESULT ANALYSIS

In Automatic Car Washing System, we performed all the operations needed to clean the car fruitfully by using PLC after achievement of the above processes by mechanism of this system car washing will be cost effective, time saving and pollution free. By using this process we can clean up the car up to 95%.

Advantages

1. Diminish manual power.
2. Proper exploitation of foam and water.
3. Easily operated system.
4. Consumption of time is less in washing.

6. CONCLUSION

Putting all discussions together, one can conclude that the proposed method for controlling automatic car wash removes restrictions that exist on common systems and introduces a unique way to create error-free and highly efficient project. This prototype will help to perform car washing automatically and results in high quality end product. It requires less man power, time and no pollution.

REFERENCES

[1] Yasar Birbir,H.Selcuk Nogay, "Design and Implementation of PLC Based Monitoring Control System for ThreePhase Induction Motors fed by PWM Inverter" ,International journal of systems applications and development, Issue 3,Volume 2,2008.

[2] Janik, A. Kupiec," Trends in Modern Car Washing" Polish J. of Environ. Stud. Vol. 16, No.6 (2007).

[3] Amir Hossein Daei Sorkhabi, Bita Khazini; "Manufacturing of Full Automatic Carwash Using with Intelligent Control Algorithms;World Academy of Science, Engineering and Technology International Journal of Mechanical, Aerospace, Industrial, Mechatronic and Manufacturing Engineering Vol:7, No:3, 2013.

[4] International Journal of engineering science and computing Automatic car washing system using PLC volume 6, issue 5, may 2016.

[5] International Journal Of Innovative Research In Electrical, Electronics, Instrumentation And Control Engineering Vol. 4 Issue 4, April 2016. Do not use the word "essentially" to mean "approximately" or "effectively."

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