IJIREEICE

ISSN (Online) 2321 – 2004
ISSN (Print) 2321 – 5526

INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH IN ELECTRICAL, ELECTRONICS, INSTRUMENTATION AND CONTROL ENGINEERING
Vol. 4, Issue 4, April 2016

PLC Based Car Washing System

Prof. Mhaske D.A.[1], Bhavthankar R.G.[2], Saindane A. R.[3], Darade D.J.[4]

Assistant Professor, Department of Electronics Engineering, P.R.E.C., Loni, India [1]

Department of Electronics Engineering, P.R.E.C., Loni, India [2,3,4]

Abstract: With the developing velocity of life, the interest to perform errands at a higher rate is being laid out as well. In the cutting edge world, innovation has connected every town, city and nation with the other through method for powerful. This has in the long run prompted a monstrous increment in the quantity of vehicles. To clean these vehicles there is a need of an appropriate washing framework. Time is merchandise that should be overseen successfully and proficiently all together amplify efficiency. So this undertaking is produced to lessen an ideal opportunity to clean vehicles. In this programmed auto washing venture we utilize a transport line on which client stop the auto. When we press a switch transport line begins moving. Clock is set on transport line at better places for auto recognition. At the point when the amateur the auto, it stops the transport line and begins a valve at the same time through water on auto comparably at various levels when an auto is identified it will utilize brushes, cleanser, and drier to clean the auto.

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

I. INTRODUCTION

Programmed auto washing framework is extremely regular in created nations. Auto washing framework is typically connected with fuel filling stations. It comprises of vast machines with robotized brushes controlled by project legitimate controllers. Programmed auto washing framework is completely robotized with various phases of frothing, washing, drying and brushing. Distinctive sorts of auto washing frameworks are talked about in this report. This framework utilizes expansive amount of water, in this way water reusing plant is likewise a fundamental part of the programmed auto washing framework yet at this level we are just displayed the auto washing as it were. We concentrated a portion of the auto washing frameworks from Internet and chose to do this venture.

When contrasted with the outside nations this framework is utilized as a part of less no of urban areas in India in light of its expense and complexity. In any case, we have attempted to minimize it as indicated by the gadget list which will be certainly helpful for our venture.

II. BLOCK DIAGRAM OF CAR WASH SYSTEM

A. PLC:

PLC (Programmable Logic Controller) is normally called as Programmable controller. It is a strong state, computerized, Industrial Computer. Upon first look, a PLC might appear to be close to a black box with wires acquiring signals and different wires sending signals out. It may likewise show up there is some enchantment being done inside that by one means or another chooses when field gadgets ought to be turned on.

In fact, there is no enchantment. The PLC is a PC, and somebody needed to let it know what to do. The PLC recognizes what to do through a project that was created and afterward gone into its memory. The PLC is a PC, however without an arrangement of guidelines letting it know what to do, it is simply a brimming with electronic segments. Without guidelines, the black box that we call a PLC can do nothing. The client system is the rundown of directions that advises the PLC what to do.

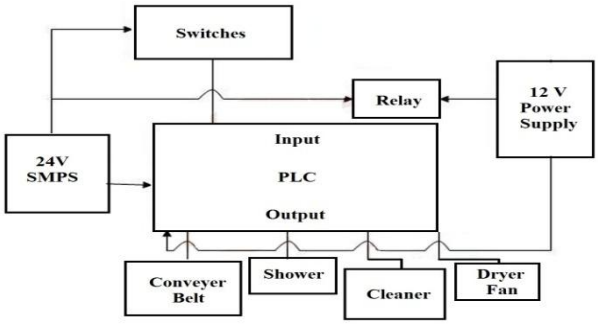

Fig. 1 Block Diagram of Car Wash System

PCs, for example, PLC can be brilliant devices; in any case it may show up. They just do precisely what the human software engineer instructed them to do. Programmable rationale controller is one of the best robotized gadgets, which is particularly used to work the particular framework programmed. PLC can without much of a stretch run numerous machines. At the point when running a PLC program, a visual operation can be seen on the screen. Subsequently investigating a circuit is brisk, simple and straightforward. A PLC system can be tried, approved and remedied sparing exceptionally important time. With wired hand-off sort boards, any project change requires time for rewiring of boards and gadgets. With PLC control any adjustment in circuit outline or arrangement is as straightforward as retyping the rationale. Remedying mistakes in PLC is short and financially savvy. In my undertaking the PLC contain five inputs and four yields are utilized. The delta organization of PLC is utilized.

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 likewise utilized, for example, strong state transfers. Transfers are utilized

IJIREEICE
ISSN (Online) 2321 – 2004
ISSN (Print) 2321 – 5526
INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH IN ELECTRICAL, ELECTRONICS, INSTRUMENTATION AND CONTROL ENGINEERING
Vol. 4, Issue 4, April 2016

where it is important to control a circuit by a low-control signal (with complete electrical detachment in the middle of control and controlled circuits), or where a few circuits must be controlled by one sign.

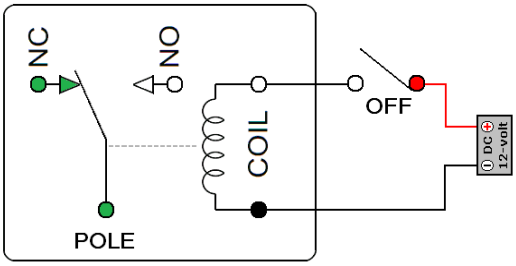

Fig. 2 Relay Coil Circuit

The primary transfers were utilized as a part of long separation broadcast circuits as intensifiers: they rehashed the sign rolling in from one circuit and re-transmitted it on another circuit. Transfers were utilized widely as a part of phone trades and early PCs to perform coherent operations.

For exchanging activity we utilizes transfer with its regularly open (NO) and typically shut (NC) contacts. Hand-off is the mechanical gadgets for exchanging activity we utilizes transfer with its ordinarily open (NO) and typically shut (NC) contacts. Which is utilized to secure to mechanical gadgets this is more essential parameter.

C. Conveyor

A transport framework is a regular bit of mechanical taking care of hardware.

Fig. 3 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.

D. Wiper engine

The electric wiper engine is a lasting magnet, rotating electric engine. A worm gear machined on the armature shaft drives the yield shaft and rigging through an idler apparatus and shaft. The yield shaft works the yield arm, which is associated with the wiper linkage. As the electric engine spins the yield arm, the linkage is compelled to move in a forward and backward movement. The velocity of the electric engine is controlled by resistors, situated on or in the control change, and associated with the wiper engine electrical windings. The control switch coordinates the ebb and flow through specific circuits of the wiper engine, as the driver wants.

A DC engine is any of a class of electrical machines that changes over direct current electrical force into mechanical force. The most well-known sorts depend on the strengths delivered by attractive fields. Almost a wide range of DC engines have some inside component, either electromechanical or electronic; to intermittently alter the course of current stream in part of the engine. Most sorts produce rotating movement; a straight engine specifically delivers constrain and movement in a straight line.

Fig. 4 Wiper Motor

DC engines were the main sort broadly utilized, since they could be controlled from existing direct-current lighting force conveyance frameworks. A DC engine's velocity can be controlled over a wide range, changing so as to utilize either a variable supply voltage or the quality of current in its field windings. Little DC engines are utilized as a part of apparatuses, toys, and machines. The all inclusive engine can work on direct present however is a lightweight engine utilized for compact force instruments and machines.

E. Power supply

Any system works on the electric supply and this supply is delivered from the power supply .For automatic car washing system we requires a two specified voltage supply like 12v and 24v SMPS .first 12v power supply is used for the working of RELAY and other mechanical driving assembly as conveyor belt, shower operation, cleaning brushes, wiper motor 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.

III. WORKING OF CAR WASH SYSTEM

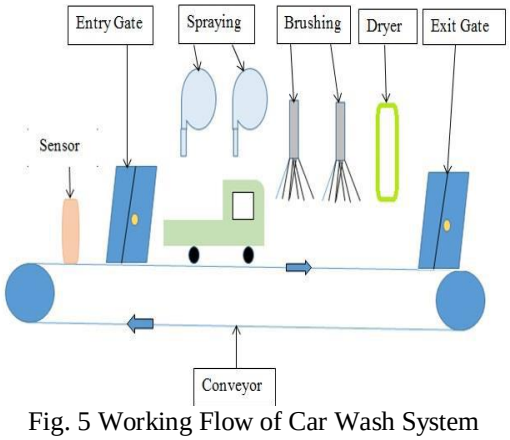

Fig. 5 Working Flow of Car Wash System

IJIREEICE
ISSN (Online) 2321 – 2004
ISSN (Print) 2321 – 5526
INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH IN ELECTRICAL, ELECTRONICS, INSTRUMENTATION AND CONTROL ENGINEERING
Vol. 4, Issue 4, April 2016

The fig. 5 demonstrates the square graph of Automatic Car Washing System. A 230V AC Supply is given as info to the SMPS for getting 24V DC, since PLC can work at 24V DC. Terminal Block is utilized for multi inputs and yields.

A. Description:

PLC is associated with PC through RS-232 correspondence link for downloading or transferring the system. Transport is utilized for moving the auto through different phases of washing. We utilize 100 rpm DC engines for driving the transport line through pulley and for driving brushes When conveyor`s segments are in great condition and very much adjusted, it will work legitimately. Appropriate clasping of auto wheels on the transport is required with a specific end goal to keep away from relocation. By and large brushes are currently either fabric (which is not destructive to an autos 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 auto. 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. 6 Wecon PLC module

- Modbus RTU / ASCII communication.
- Programmable Logic Ladder 4K.
- RS-232 HMI with a PC is connected to the RS-485 and PC, HMI, Inverter, Temperature Controller Servo, PLC, etc.
- Communicate ASCII protocol serial communication commands that support communication with devices.
- Micro-modular design (no need for rack)..
- On the CPU 6 inputs, 4 output also 8 / 16 point input / output additional units.
- 8 private module (analog / temperature) connectivity (DI / DO is not occupied).
- Custom modules, RS-485 communication port.
- Total of 13 32-bit counter, single-phase 30kHz, dual-phase 7 kHz high-speed counter input.
- Single-phase 10 kHz, 5 kHz high-speed dual-phase pulse output.
- User-friendly programming software Soft WPLCE, UL approved.

V. RESULTS AND CONCLUSION

A. Result

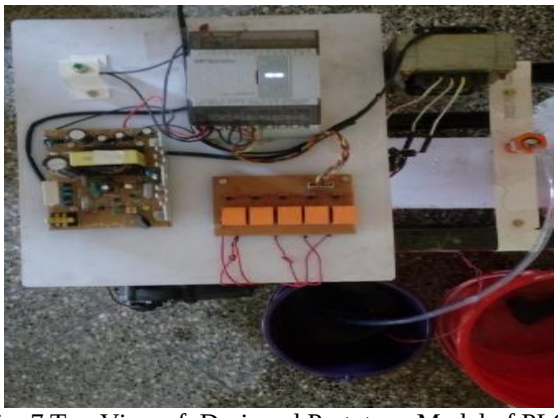

Fig. 7 Top View of Designed Prototype Model of PLC Based Car Wash System

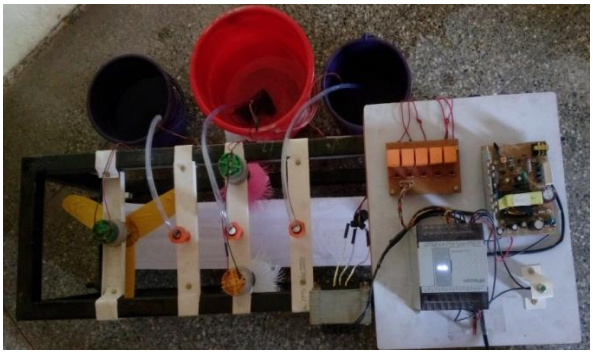

Fig. 8. Assembly of car wash system

Fig. 9. Working of car wash system

B.CONCLUSION

This model will perform auto washing consequently results in brilliant deciding item. Therefore it will be User-accommodating and skilled to wash different autos at once. Likewise require less labor, time and no contamination.

After completion of the project auto car washer and dryer, we can conclude that such automation system are quite beneficial, and saving time of operation and also man power reduced, improving the economy of the system the future such type 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 is plays an important role in smart city development ideas because for the city becomes smart the system becomes more easy and

cost effective as well as it have long life to become and look effective and efficient.

C.ADVANTAGE

1) The whole system is automatic so no manpower required: this system is based on PLC automation so totally work is in digital format this wills requires only mechanical assembly.
2) If we use special car washing pressure pumps no compressor will required: the car washing pressure pumps are automated there have no requirement of externally compressed pressure.
3) 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.
4) Very less maintenance: As we uses the PLC this is more durable than other electro-mechanical system.
5) 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.
6) No. more space required. No. environmental pollution: the module of PLC is very small, so it does not requires 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.

REFERENCES

1. "Research on hand washing vs automatic washing" by International Carwash Association with University of Texas at Arlington, Texas.
2. AmirHosseinDaeiSorkhabi,BikaKhazini, "Manufacturing of Full Automatic Carwash Using With Intelligent Control Algorithms" IEEE Vol:7 No:3,2013
3. John W. Webb and Ronald A. Reis," Automating Manufacturing Systems with PLCs,Hugh Jack Publishing year: 2008 Hardware platform: Allen Bradley
4. Muhammadali.V.V, Programmable Controller, Principles and Applications". "Seminar on Automatic Car Washing System".
5. Introduction to PLC controllers Author: Nebojsa Matic Publisher: Mikroelektronika Publishing year: 2007
6. Author: Group of authors, Edited by Luiz Affonso Guedes Programmable Logic Controller Publisher: In the Publishing year: 2010 Hardware platform: Universal
7. www.wicon.com
8. www.ieee.com
9. www.kkeindia.com
10. www.rockwellautomation.com
11. www.indiamart.com/3-brush-programmed auto wash-system.html
12. www.youtube.com/programmed auto wash
13. .Liping Guo, " Design Projects in a Programmable Logic Controller (PLC) Course in Electrical Engineering Technology",The Technology Interface Journal/Fall 2009

BIOGRAPHIES

Prof. Dipak A. Mhaske, has completed his M.E.(Electronics) & B.E. (Electronics), Member of IEEE. He is working as a Assistant Professor in Electronics Department, Pravara Rural Engineering College, Loni, Dist. Ahmednagar, Maharashtra, India. Prof.D. A. Mhaske has teaching experience of 04 yearsto Graduate Students. Prof.D. A.Mhaske has Published 04 papers in International Journal, 01paper in National Journal & presented 03 papers in National Conference.

Mr.Bhavthankar Rahul G. engineering degree from PRAVARA RURAL ENGG college, loni. Dist. ahmednagar, Maharashtra, India. I presented paper in NATIONAL LEVEL event.

Mr.Akshaykumar R.Saindane, is pursuing his B.E Electronics engineering degree from PRAVARA RURAL ENGG college, loni. Dist. Ahmednagar ,Maharashtra, India. I presented paper in NATIONAL LEVEL event.

Mr.Dnyaneshwar j.Darade, is pursuing his B.E Electronics engineering degree from PRAVARARURAL ENGG college, loni. Dist. ahmednagar, Maharashtra, India .I presented paper in NATIONAL LEVEL event.