Project Report
On

“Automatic Car Washing System”

By

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ABSTRACT

Automatic car washing system is very common in developed countries. Car washing system is usually associated with fuel filling stations. It consists of large machines with automated brushes controlled by program logical controllers (PLC).

Automatic car washing system is fully automated with different stages of foaming, washing, drying and brushing. An automatic car washing system is discussed in this report. This system uses large quantity of water, thus water recycling plant is also an integral part of the automatic car washing system but at this level we are only presented the car washing only. We have observed some of the car washing systems from Internet and decided to do this project.

As compared to the foreign countries this system at the present time is used in very few cities in India because of its cost and complexity. But we have tried to minimize it according to the device list which will be definitely helpful for our project. This project simulation has been implemented on Siemens PLC S7-200.

Components

- **Load Cell**
  A load cell is a transducer that is used to create an electrical signal whose magnitude is directly proportional to the force being measured. The various load cell types include hydraulic, pneumatic, and strain gauge.

- **Push Button for initializing wash process**
  A Push Button is placed at the entrance so that when the car is detected by the sensors and the load test has been performed successfully a LED within the Push Button glows indicating that the car wash is now set for the next car to enter.

- **Proximity sensor**
  A Proximity sensor has been set at the initial point of entry, and also at the other points the in processes, that will halt the conveyor motor timely. These points are namely
  Point 1 – Foam Jet Station
  Point 2 – Water Jet Station
  Point 3 – Washing Station
  Point 4 – Air Blower
  Point 5 – Brushing Station

- **Foam and Water Tank**
  High Level Sensor and Low Level Sensors have been installed in these tanks that fill as the low level sensors are high through the pump or the refill of the foam.

- **Foam jet and Water jet**
  High Pressure cleaning with oscillating pencil jet nozzles.

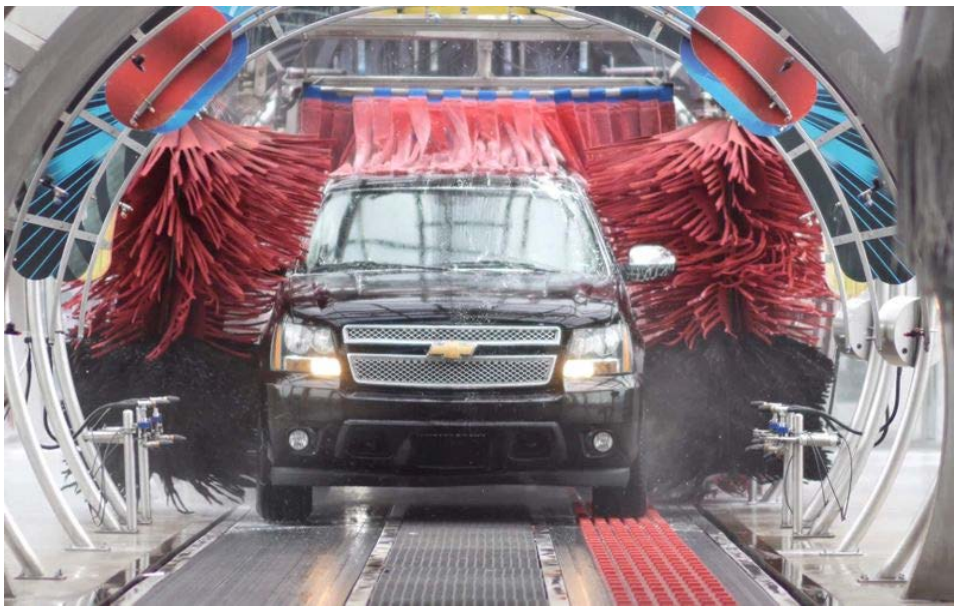
- **Rotating brushes**
  For the washing and the dry brushing after the hot air blow.
- **Water pump**
  To fill the Tank of water for the wash.

- **Conveyor motor**
  DC Stepper Motor Conveyor for the movement of the car at the wash.

- **Finish green led**
  At the end of wash a green LED will glow that indicated the car is now all done and can exit the car wash.

Stages of car wash

1. Entry
1. Load Test
2. Point 1 - foam jet
3. Point 2 - water jet
4. Point 3 - washing with roller brushes from top and sides
5. Point 4 - air blower
6. Point 5 - Dry brush
7. Exit



A Car at the Washing Stage

Working

A main start button is switched on with starts the entire car wash. Now the car weight is tested by the load cell and is taken as the analog input (AIW2) which is read and moved to the output memory (QW3).

This weight is now compared via data compare instruction, if the condition is satisfied and the Level Sensors conditions are true, an LED of the Push Button will glow. Only when this LED is glowing, will the actuation of the conveyor motor (Subroutine SBR_3) initialize on the pressing of the Push Button.

Now after the Conveyor starts (SBR_3) and the car reaches point 1: Foam Jet a proximity sensor senses the vehicle and halts the conveyor for about 10 seconds (SBR_1) for the Foam and Chemical coating for removal of stubborn stains and dirt, after 10 seconds the conveyor is resumed and the vehicle moves to the next point. Point 2: Water jet, here the same process takes place - halting of the conveyor and water being sprayed by a high pressure cleaning with oscillating pencil jet nozzles. The same process takes place at points 3 and 5, which are the washing point and the final dry brushing. The vehicle is not halted at point 4: air blower station.

When the car crosses the end sensor, a Green LED will glow indicating that the wash is complete and vehicle can now exit the car wash. The cars that pass the end sensor are counted using a counter (C0).

If tanks of Foam and Water reach Low level sensor, water is filled by the pumps so that the process is not halted unnecessarily.

An emergency stop (I1.0) is provided to stop the process as well as the PLC at any given moment.

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Author:
Created: 04/24/2018 01:23:07 pm
Last Modified: 04/24/2018 06:00:03 pm

Symbol	Var Type	Data Type	Comment
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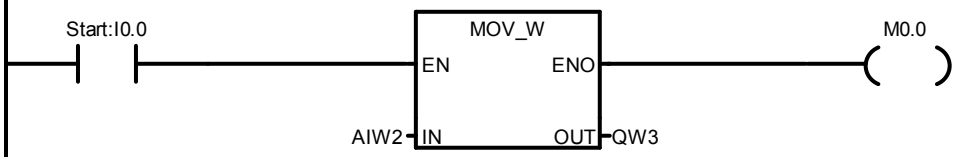
	TEMP		
	TEMP		
	TEMP		

PROGRAM COMMENTS

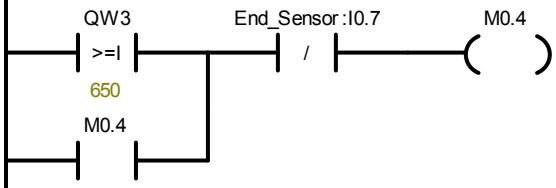
Network 1 Network Title

Network Comment



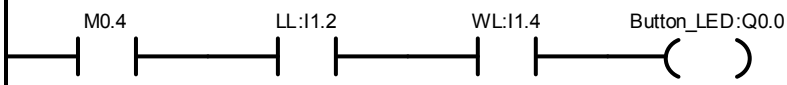
Symbol	Address	Comment
Start	I0.0	

Network 2



Symbol	Address	Comment
End_Sensor	I0.7	

Network 3



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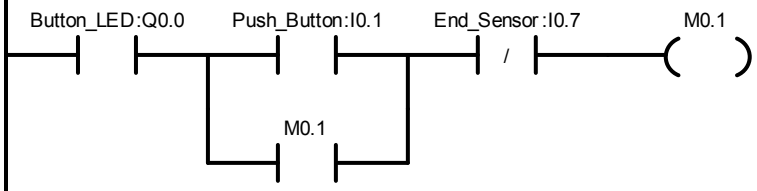
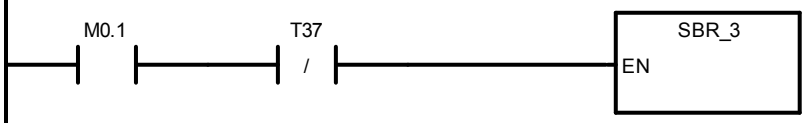
Button_LED	Q0.0	
LL	I1.2	
WL	I1.4	

Network 4



Symbol	Address	Comment
Button_LED	Q0.0	
End_Sensor	I0.7	
Push_Button	I0.1	

Network 5



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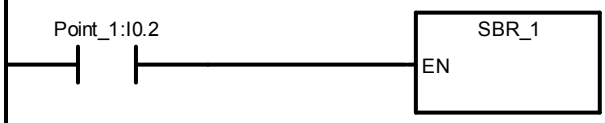
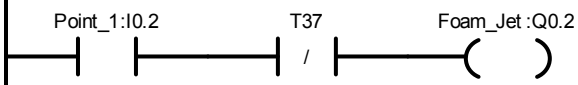


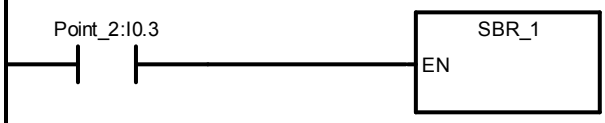
Symbol	Address	Comment
Point_1	I0.2	

Network 7



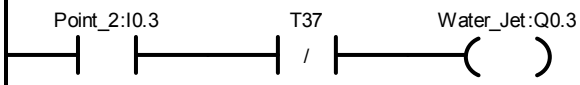
Symbol	Address	Comment
Foam_Jet	Q0.2	
Point_1	I0.2	

Network 8



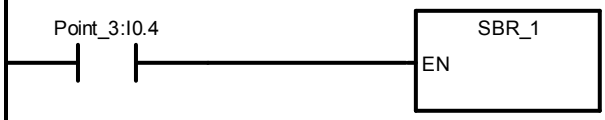
Symbol	Address	Comment
Point_2	I0.3	

Network 9



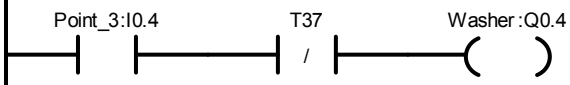
Symbol	Address	Comment
Point_2	I0.3	
Water_Jet	Q0.3	

Network 10



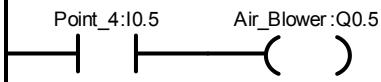
Symbol	Address	Comment
Point_3	I0.4	

Network 11



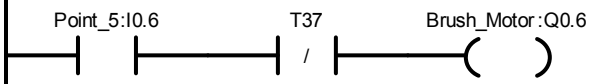
Symbol	Address	Comment
Point_3	I0.4	
Washer	Q0.4	

Network 12



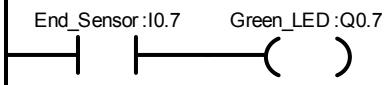
Symbol	Address	Comment
Air_Blower	Q0.5	
Point_4	I0.5	

Network 13



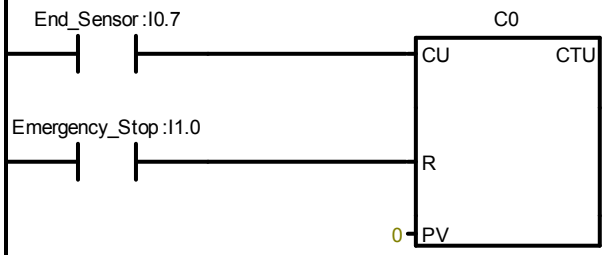
Symbol	Address	Comment
Brush_Motor	Q0.6	
Point_5	I0.6	

Network 14



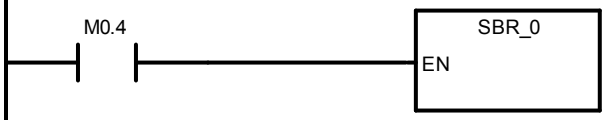
Symbol	Address	Comment
End_Sensor	I0.7	
Green_LED	Q0.7	

Network 15



Symbol	Address	Comment
Emergency_Stop	I1.0	
End_Sensor	I0.7	

Network 16



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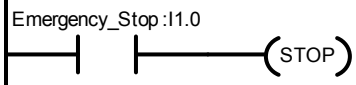

Symbol	Address	Comment
Emergency_Stop	I1.0	

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Symbol	Var Type	Data Type	Comment
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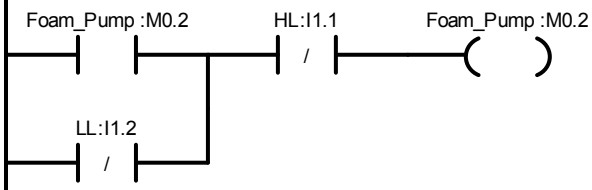
	IN_OUT		
	OUT		
	TEMP		

SUBROUTINE COMMENTS

Network 1 Network Title

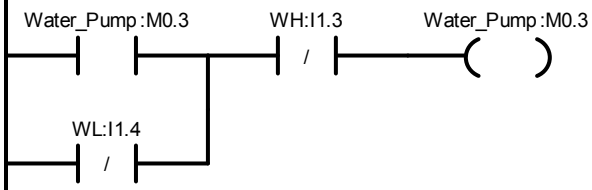
Network Comment



Symbol	Address	Comment
Foam_Pump	M0.2	
HL	I1.1	
LL	I1.2	

Network 2 Network Title

Network Comment



Symbol	Address	Comment
Water_Pump	M0.3	
WH	I1.3	
WL	I1.4	

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Symbol	Var Type	Data Type	Comment
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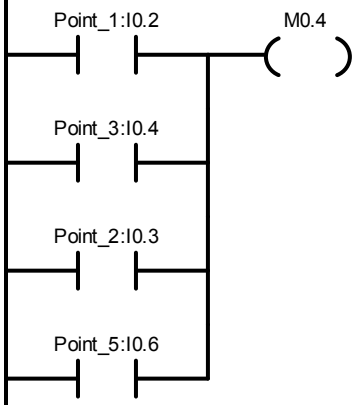
	IN_OUT		
	OUT		
	TEMP		

SUBROUTINE COMMENTS

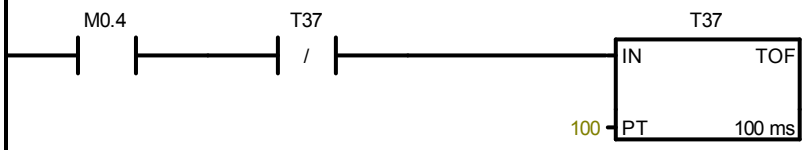
Network 1 Network Title

Network Comment



Symbol	Address	Comment
Point_1	I0.2	
Point_2	I0.3	
Point_3	I0.4	
Point_5	I0.6	

Network 2



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	TEMP		

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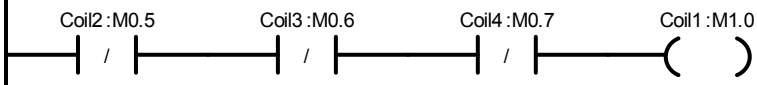
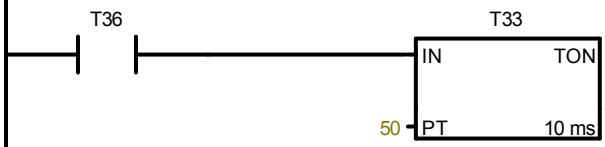


Symbol	Address	Comment
Coil1	M1.0	
Coil2	M0.5	
Coil3	M0.6	
Coil4	M0.7	

Network 2



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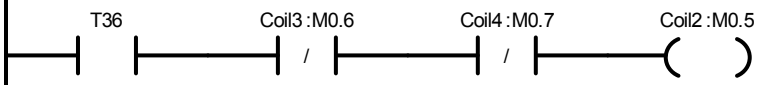
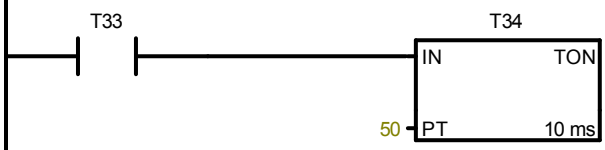


Symbol	Address	Comment
Coil2	M0.5	
Coil3	M0.6	
Coil4	M0.7	

Network 4



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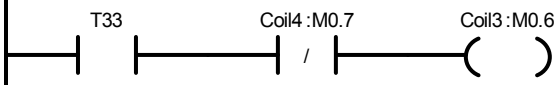

Symbol	Address	Comment
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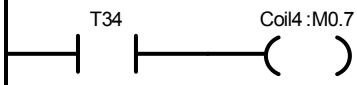
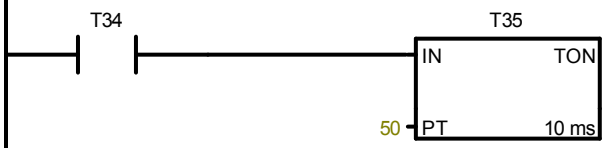
Coil4	M0.7	

Network 6



Symbol	Address	Comment
Coil4	M0.7	

Network 7



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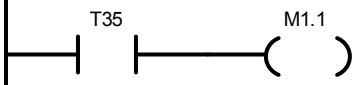
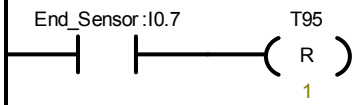
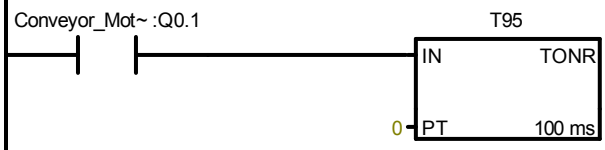


Network 9



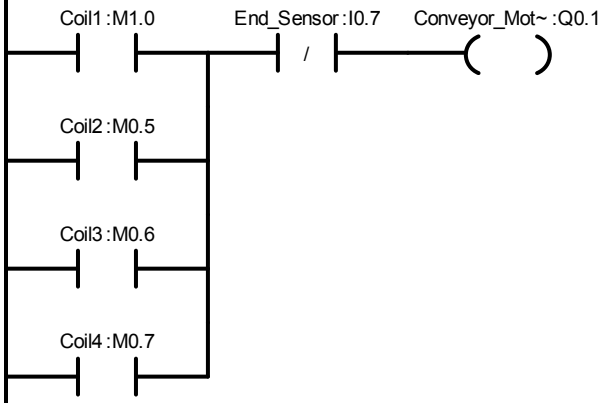
Symbol	Address	Comment
End_Sensor	I0.7	

Network 10



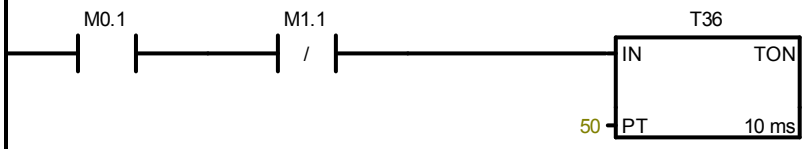
Symbol	Address	Comment
Conveyor_Motor	Q0.1	

Network 11



Symbol	Address	Comment
Coil1	M1.0	
Coil2	M0.5	
Coil3	M0.6	
Coil4	M0.7	
Conveyor_Motor	Q0.1	
End_Sensor	I0.7	

Network 12



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Symbol	Var Type	Data Type	Comment
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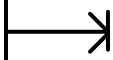
	TEMP		
	TEMP		
	TEMP		

INTERRUPT ROUTINE COMMENTS

Network 1 Network Title

Network Comment



Symbol	Address	Comment
Coil1	M1.0	
Coil4	M0.7	
Coil3	M0.6	
Coil2	M0.5	
Start	I0.0	
Push_Button	I0.1	
Point_1	I0.2	
Point_2	I0.3	
Point_3	I0.4	
Point_4	I0.5	
Point_5	I0.6	
End_Sensor	I0.7	
Emergency_Stop	I1.0	
HL	I1.1	
LL	I1.2	
WH	I1.3	
WL	I1.4	
Foam_Pump	M0.2	
Water_Pump	M0.3	
Button_LED	Q0.0	
Conveyor_Motor	Q0.1	
Foam_Jet	Q0.2	
Water_Jet	Q0.3	
Washer	Q0.4	
Air_Blower	Q0.5	
Brush_Motor	Q0.6	
Green_LED	Q0.7	

Symbol	Address	Comment
SBR_0	SBR0	SUBROUTINE COMMENTS
SBR_1	SBR1	SUBROUTINE COMMENTS
SBR_3	SBR3	
INT_0	INT0	INTERRUPT ROUTINE COMMENTS
MAIN	OB1	PROGRAM COMMENTS