AUTOMATION OF CONVEYOR USING PLC

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Abstract— **A programmable logic controller (PLC) is a digital computer used for automation of electromechanical processes, which is a type of computer family and they have commercial and industrial applications. The development of programmable logic controller (PLC) makes it possible to do the required changes to the program without changing the electrical circuit connections. The Siemens s7-300 series programmable logic controller is used to mechanize the system. This paper presents an automation of conveyor belt logic using a programmable logic controller. For this system s7-300 PLC (CPU 313c) used and software for programming used is simatic manager.**

Index Terms— **PLC, conveyor motor, s7-300, function block, functional block diagram.**

I.INTRODUCTION

The PLC has its origin in the motor manufacturing industries. Manufacturing processes were partially automated by the use of rigid control circuits, electrical, hydraulic, pneumatic. It was found that when ever change had made, the system had to be rewired or reconfigured. The use of wiring of boards on which could connections could be changed by unplugging them and changing them around followed. With the development of microcomputers it was realized that if the computer could switch things on or off and respond to a pattern of inputs, then the changes could be made by simply reprogramming the computer and so the PLC was born.PLC is an industrial computer control system that continuously monitors the state of input devices and makes decisions based upon a custom program to control the state of output devices. Almost any production line, machine function, or process can be greatly enhanced using this type of control system. However, the biggest benefit in using a PLC is the ability to change and replicate the operation or process while collecting and communicating vital information. Another advantage of a PLC system is that it is modular. That is, you can mix and match the types of Input and Output devices to best suit your application.

The PLC hardware is digital electronic devices with memory can be programmed to store commands or Information and the implementation of various operations such as logical operations, arithmetic and timing. There are several companies (PLC's) devices such as Siemens who produced SIMATIC 200, SIMATIC 300, and SIMATIC 400.
Allen Bradley Inc., Mitsubishi and many others. Each company has its own software, but all accomplish the required job of the (PLC's)

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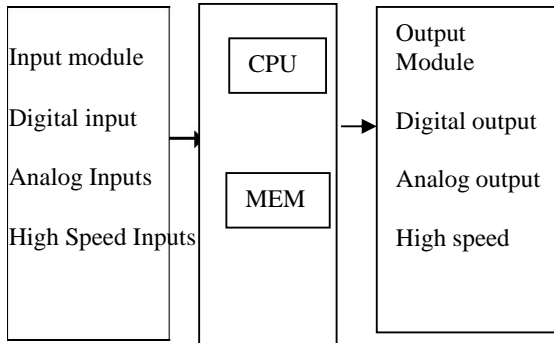39

II.Block diagram of PLC.

Fig.1

III. How does a PLC operate?

There are four basic steps in the operation of all PLCs; Input Scan, Program Scan, Output Scan, and Housekeeping. These steps continually take place in a repeating loop.

Four Steps In The PLC Operations

1.) Input Scan
Detects the state of all input devices that are connected to the PLC

2.) Program Scan
Executes the user created program logic

3.) Output Scan
Energizes or de-energize all output devices that are connected to the PLC.

4.) Housekeeping
This step includes communications with programming terminals, internal diagnostics,etc.

Styles

Unitary –The unitary PLC contains every feature of a basic system in one box. They are attached to machine being controlled.

Modular-These use range of modules that slot together to build up system. The basic modules are power supply ,cpu, input and output module. Other modules can be added such as ADC, DAC.The main advantage is no of input and outputs can be expanded.

Rack mounting-This is similar concept to modular design but modules are on standard card that slot into a standard rack inside a cabinet. These are flexible and allow expansion of system.

Siemens S7-300 PLC Programmable Logic Controller or PLC is an intelligent system of modules, which was introduced in the control, & instrumentation industry for replacing relay based logic . Over a period of time, better I/O handling capabilities and more programming elements have been added along with improvement in communication.

IV.Advantages of PLC over Relay Logic

1- Flexible control, change any industrial process by modifying the program.
2- Maintenance and the discovery of faults in the PLC system are easily seen on the PLC screen.
3- Small size.
4-Has characteristics that are not available in normal computer.
5-Ability to engaged with other PLC devices or other computers.
6. Instant monitoring system.
7. Low cost
8. Durability, it is designed to withstand moisture, vibration and noise.
9. PLCs can be used in commercial and residential to solve the complex switching requirements.

V.Siemens s7-300

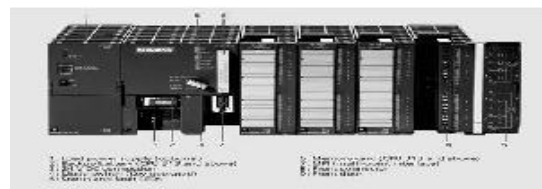Following photograph shows details of cpu 313c[6]

Fig.2

The modular mini PLC system for the low-end and mid performance ranges With a comprehensive range of modules for optimum adaptation to the automation task Flexible usage through the easy implementation of distributed structures and versatile networking capability User-friendly handling and uncomplicated, fan-free design Trouble-free expansion when your task grow Powerful thanks to a large number of integrated functions.
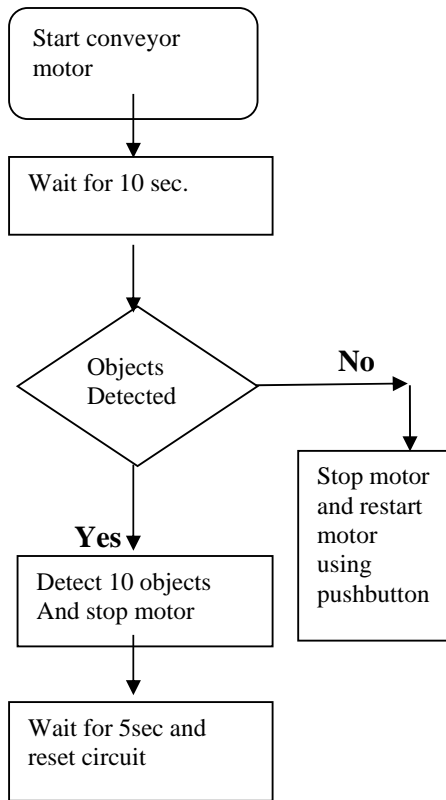
VI. FLOW CHART

Fig.3

VII. Program in Simatic Manager software

Here to make program faster and save memory function block used. Following pictures shows program to control conveyor motor in function block. Here programming language used is functional block diagram.
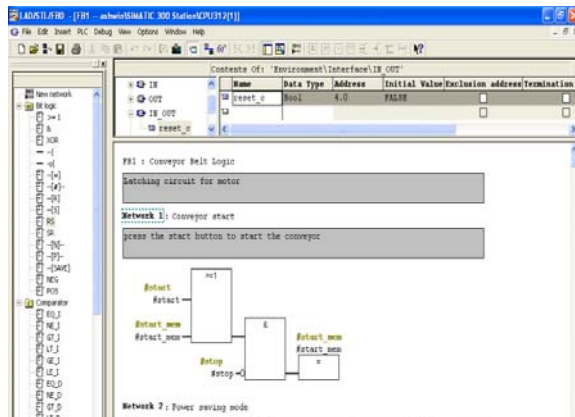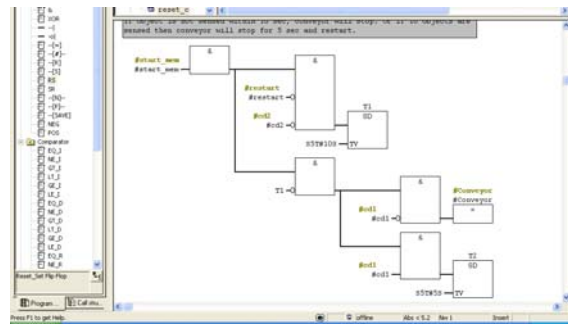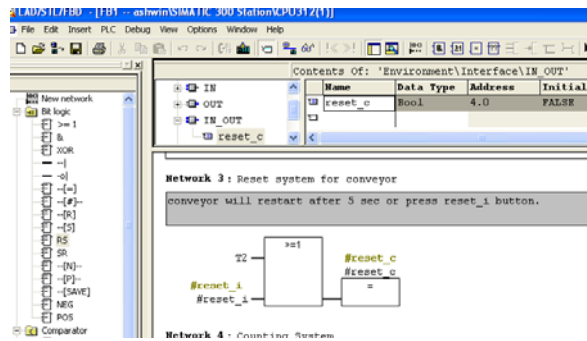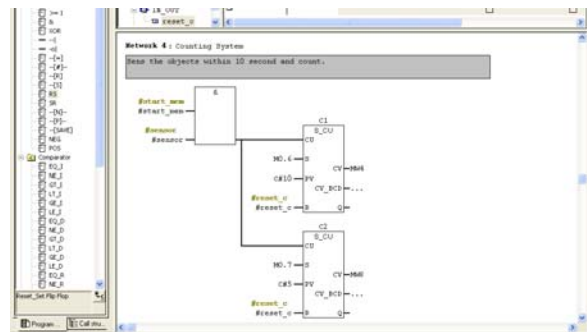

Fig.4

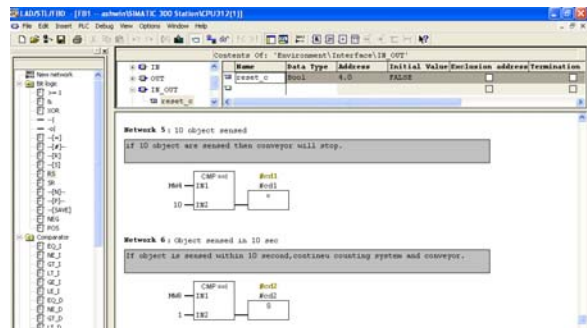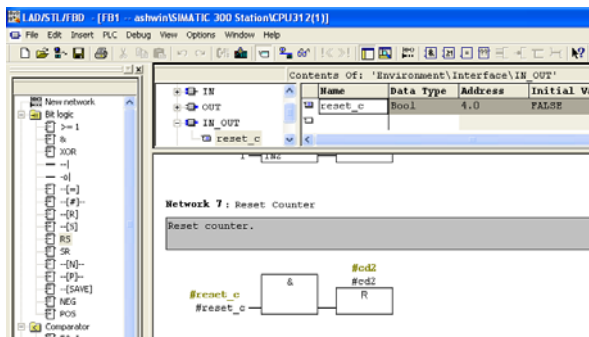
Fig.5

Fig.6

Fig.7

Fig.8

Fig.9

Conclusion

This Project idea when implemented commercially will result in efficient monitoring and control of industrial automation i.e monitoring and controlling of conveyor belt. There will be immense control and monitoring capabilities once this product is launched in industries. In future, further development is envisaged that may lead to a commercially available product.

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