JETIR.ORG ISSN: 2349-5162 | ESTD Year : 2014 | Monthly Issue
JOURNAL OF EMERGING TECHNOLOGIES AND INNOVATIVE RESEARCH (JETIR)
An International Scholarly Open Access, Peer-reviewed, Refereed Journal

PROGRAMMABLE LOGIC CONTROL

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Abstract :

The programmable Logic Controller (PLC) is the central controlling unit in the industry or a process. The effective operation of the process and safety considerations if programmed appropriately can meet the required objectives. The present technical paper briefly distinguishes the present automation systems and the past technologies to identify and explore the capabilities of PLCs for any process. The relay logic and contactor logics (RLC) were practiced in the olden days which include the human intervention and errors. The advent and application of microprocessors, microcontrollers and new specific tools such as PLCs, Supervisory control and data acquisition (SCADA) and Distributed control systems (DCS) have increased productivity, accuracy, precision and efficiency. These systems reduced human intervention and increased the flexibility in the process control. The keyword automation clearly states that the working of a process or repetition in an efficient manner by incorporating mechanisms and control sequences in the proper order

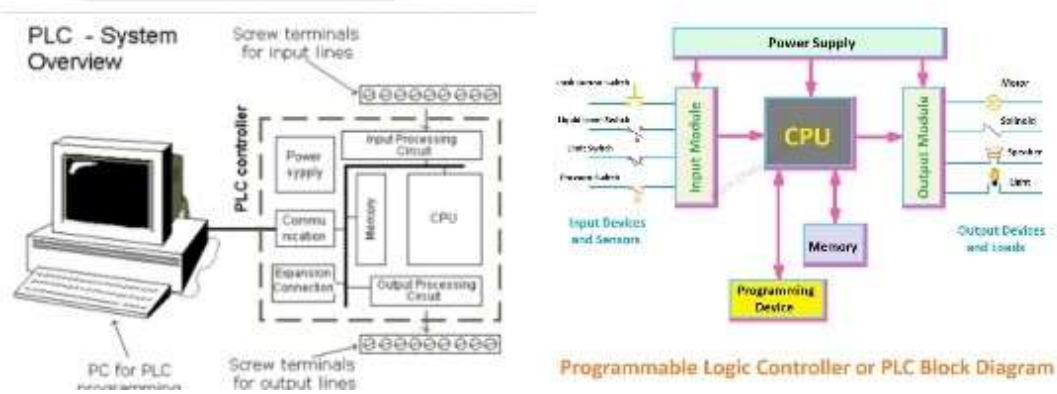
several times with acceptable deviations in the output of the process.

Keywords:
Automation, PLC, Logic control, SCADA and DCS

INTRODUCTION:

programmable controller is an industrial computer that has been ruggedized and adapted for the control of manufacturing processes, such as assembly lines, machines, robotic devices, or any activity that requires high reliability, ease of programming, and process fault diagnosis.

PLC stands for Programmable Logic Controllers. They are basically used to control automated systems in industries. They are one of the most advanced and simplest forms of control systems which are now replacing hardwired logic relays at a large scale. Programming Logic Controller (PLC)



PLCs are complex and powerful computers; it takes inputs, performs logic on the inputs in the CPU and then turns on or off outputs based on that logic. We can take the following case for example:

1. The CPU monitors the status of the inputs (for example, proximity sensor off, valve 40% open, etc.)

2. The CPU takes the information that it gets from the inputs and performs logic on the inputs
3. The CPU operates the outputs based on the logic (for example, turn off motor, open valve, etc.)

WHY IS PLC L?

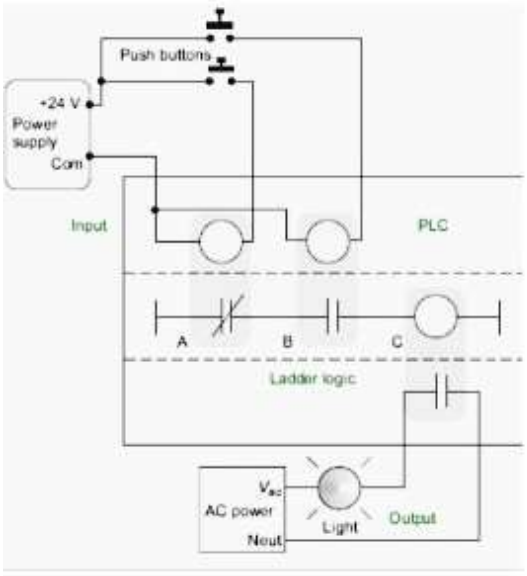
- Very fast
- Easy to change logic i.e. flexibility
- Reliable due to absence of moving parts • Low power consumption
- Easy maintenance due to modular assembly
- Facilities in fault finding and diagnostic
- Capable of handling of very complicated logic operations
- Good documentation facilities
- Easy to couple with the process computers
- Analog signal handling and close loop control programming
- Counter, timer and comparator can be programmed

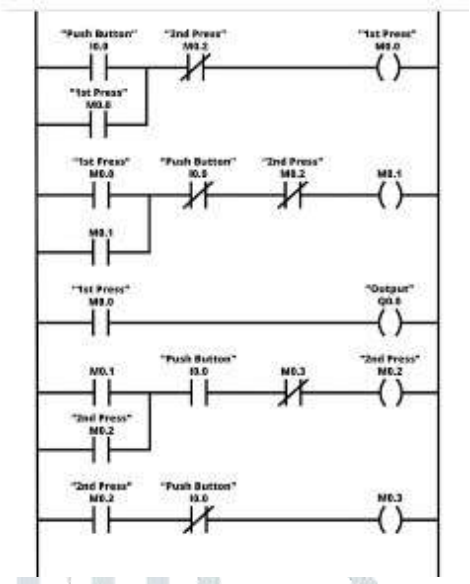
Programming a PLC:

To begin programming on a PLC, usually ladder logic is used. Ladder logic was developed exclusively for programming a PLC. In ladder logic, symbols are used to program the device. These symbols are connected by a line that indicated the flow of the program. Just like other programming languages, ladder logic is sequential and each new line in the program is called a rung.

The name ladder logic is due to the appearance of the program, once it has been completed, as it resembles a ladder. The entire program is a representation of a circuit,

and the rungs show the wiring and flow of current between the different module





Working:

The PLC (Programmable Logic Controller) acts as a small scale computer that has the tendency to control machines and heavy-duty equipment.

The components of a standard PLC unit can be divided into three categories.

- The power supply and rack
- The central processing unit (CPU)
- The input and output section/Interface

The Power Supply and Rack of Programmable Logic Controller:

If we remove all equipment and all the parts attached to a PLC, we are left with only a simple structure/frame, i.e., rack and power supply, which provides a regulated DC power to other components.

The rack acts as the base for other components and ties everything together. The power is supplied to the PLC through a port in the rack. PLCs usually operate in the areas with AC supply, and PLCs operate on DC voltage. So, the power supply that comes

along the PLC has an integrated system within that converts AC into DC.

APPLICATION

- Transportation System likes Conveyor Belt System.
- Packing and Labeling System in Food 8 Beverage.
- Bottle or Liquid Filling System.
- uses for the Smart Grid System to Monitor and Detect fault conditions.
- It is used in the Power Generation, Transmission, and Distribution
- Power Substation, PLC can use the Auto Assembly Line System
- Water Tank Level Control System
- Car Washing and Parking System.
- Flashing Light Controlling System.
- Door Opening/Closing System.

Advantages of PLC:

- Rugged and deslgngd to withstand vlbratlons, temperature, humldlty and noise
- PLC has a lotof contacts and low cost and safe
- It has a very faster scan tlme, It has a fast operatlng tlme
- Awlde range of control appllcatlon
- It has capable to communicate with a computer In the plant
- It has great computational capabilities
- It has shorter training time required

- It has a small physlcal slze
- It has project cost can be accurately calculated
- It has supervlsory control capablllty
- PLCs are easily programmed and it was relatively easily understood programming language
- Have interfacing for input and output already inside the controller
- One slngle programmable logic controller can easily run many machines so It Is flaxible
- It has high-speed counters
- It has shorter project implementation time
- Troubleshootlng In programming and reprogramming
- The documentation was easy to do
- It has a hlgh level of rellablllty and low malntenance
- Security in termsof programming
- Adaptlve to changes In production

Disadvantages of PLC:

- There is too much work required in connecting wires
- It has fixed circuit operation
- PLCs manufacturers offer only closed-loop archltecturek
- PLC Is ngw technology so that should requlrg tralnlng
- There Is a llmltatlon ofworklng of PLCs under high temperature, vlbratlons condltlons
- Soma PLCs turn on when power is restored and may causa an accident
- There IS a difficulty with changes or replacement
- Need extra security aquipmant such as really
- Some appllcatlon that performs a slngle functlon Is not efflclent In the use of PLC
- Limited usaga environment high temperature and harsh vibration can disrupt electronlcs equlpment on the PLC
- PLC is not considered necessary when it has applied to industrial systems that do not need to change the wlrlng
- PLC is designed by semiconductor, which depends on the thermal characteristics
- It Is always dlfflcult to find an error and rgqulre a skllful workforce
- When uses PLC, a problem occurs hold up time Is Indeflnlte usually long
- Number of operatlonal modules must be added to maxlmlze flexlbllity and performance
- PLCs are propitiatory, meaning that the software and the usaof parts can't ba easily used by ona manufacturer in combination with some uses by another manufacturer

CONCLUSION:

PLC has an internal function such as timer and counter making it become sophisticated but simple in used. It also provides flexibility of control that based on the programming and can execute simple logic instruction which being used in ladder diagram.

Acknowledgment :

This paper was submitted as an part of assignment for the subject of bi010kY for mechatronics engineering.

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