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PLC Based Automation System

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Abstract:
Due to the development of modern methods in manufacturing industries, the conventional method of using relays, timer, which were used to control the process of manufacturing, were not up to the accuracy and speed of operation. This was mainly affected for the quality output from the industries. To overcome the above problem we can eliminate the high costs associated with inflexible, relay-controlled systems, Minimize the Number of Control Relays in a Process some of the modern methods used were microcontroller and microprocessor etc. But due to some limitation of the above modern control methods it was complex to operate and process. By the introduction of programmable logic controller (PLC) gave the best solution to all the problems which were faced by most of manufacturing industries is found PLC can be easily interfaced to many control equipment's . It can be programmed easily using ladder diagram or logic diagram. A PROGRAMMABLE LOGIC CONTROLLER is a solid state control system that continuously monitors the status of devices connected as inputs. Based upon a user written program, stored in memory, it controls the status of devices connected as outputs.

- A digital electronic device that uses a programmable memory to store instructions and to implement specific functions such as logic, sequence, timing, counting and arithmetic to control machines and process.
- It uses a programmable memory to store the instructions and specific functions that include On/Off control, timing counting, sequencing, arithmetic and data handling.

A PLC is a computer designed to work in an industrial environment

I. INTRODUCTION

Need of PLC

- Hardwired panels were very time consuming to debug and change.
- The following requirements for computer controllers to replace hardwired panels.
- Solid-state not mechanical.
- Easy to modify input and output devices.
- Easily programmed and maintained by plant electricians.
- Be able to function in an industrial environment

PLC OPERATION

❖ **CHECK INPUT STATUS**

First the PLC takes a look at each I/O to determine if it is on or off.

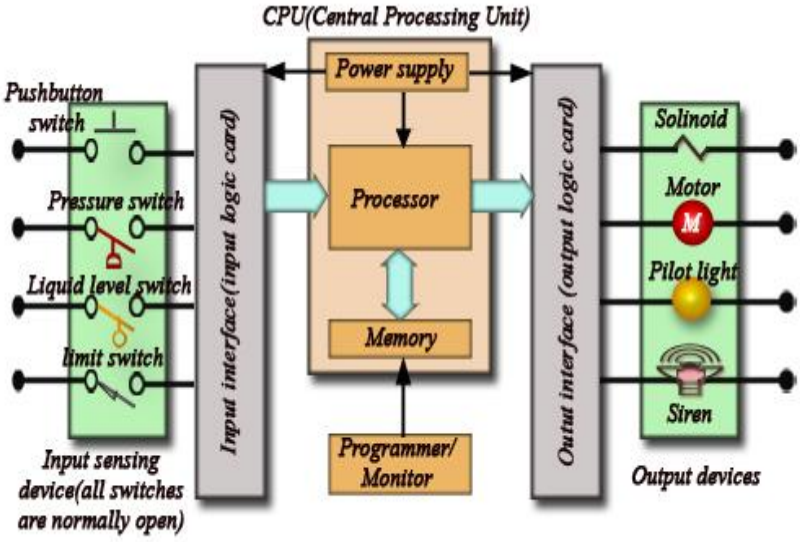
❖ **EXECUTE PROGRAM**

Next the PLC executes the program

❖ **UPDATE OUTPUT STATUS**

Finally the PLC updates the status of the outputs .It updates the outputs based on which inputs were on during the first step. In this project we are going to use PLC module which is having 6 input and 4 output to control the 1-phase Induction motor, heater ,lamp, siren with input devices like push button switch ,limit switches, the mister . as they are applicable in the manufacturing industries for improving production quality.

Block diagram of PLC based automation system



As shown in block diagram, it mainly consists of 3 blocks

1) Input devices
2) CPU unit
3) Output devices and

Power supply module

In the input side there will be input devices like push button switch, pressure switch etc which provides input single to the controller.

Programmable logic control is a digitally operating electronic apparatus which uses a programming memory for the internal storage of instructions for implementing specific functions.

Hardware requirements

- Motor
- Sieren
- Heater
- Smps module
- Lamp
- Relays
- Contactors
- Push button switch
- Limit switches

CPU model: Mitsubishi GC35MH-16MR-D , 24VDC IN 8-inputs 8-relay outputs ,

Software required: CODESYS V2.3

Interface: ETHERNET

- Used in short-distance computer communications, with the majority of computer hardware and peripherals.
- Has a maximum effective distance of approx. 30 m at 9600 baud.

The controller is programmed using ladder diagram or logic diagram

A Logical Diagram is a diagram representing the logic elements and their implementations without any engineering details

The logic can be changed easily as per the requirement of the application

And in the output devices there will be devices which will be operated as per the inputs command and logics.

In the power supply module consists of SMPS for the cpu and input/output e cards and 3-phase or 1-phase supply for input and output devices.

Advantages

- Reliable
- Easy to Change Logic
- Low Power consumption
- Easy Operator Interface
- Easy maintenance

Delimits

- In contrast to microcontroller systems which are an open architecture, most PLCs manufacturers offer only closed architectures for their products.
- PLC devices are proprietary, which means that parts and software from one manufacturer can‘t easily be used in combination with parts of another manufacturer, which limits the design and cost options.
- To maximize PLC performance and Flexibility, a number of Optional Modules must be added

Application

- Manufacturing / Machining
- Food / Beverage
- Metals
- Power
- Mining
- Petrochemical / Chemical

II. REFERENCE

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