

Review On Industrial Automation

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Abstract- In our day-to-day life there are many technology are used. We can recently see that automatic system is started to use in everywhere but this mostly used in industries. This paper is give automation technology used in industries with their application..The future is all about on Automation to increases productivity and optimum time, cost of the manufacturing product.

Keywords- Automation, PLCs, SCADA, Hierarchy and Application of Automation system.

I. INTRODUCTION

Automation can be defined as the technology by which a process or procedure is performed without human assistance. Automation has been achieved by various means including mechanical, hydraulic, pneumatic, electrical, electronic devices and computers systems.

The benefits of Automation include labor savings, savings in electricity costs, savings in material costs, and improvements to Quality, accuracy and precision.

The term automation, inspired by the earlier word automatic (coming from automaton), was not widely used before 1947, when Ford established an automation department. It was during this time that industry was rapidly adopting feedback controllers, which were introduced in the 1930s. [1]

Automation takes a step further mechanization that uses a particular machinery mechanism aided human operators for performing a task. Mechanization is the manual operation of a task using powered machinery that depends on human decision making. On the other hand, automation replaces the human involvement with the use of logical programming commands and powerful machineries.

In a brief, industrial automation can be defined as the use of set technologies and automatic control devices that results the automatic operation and control of industrial processes without significant human intervention and achieving superior performance than manual control. These automation devices include PLCs, PCs, PACs, etc. and

technologies include various industrial communication systems.

II. LITERATURE REVIEW

Our literature survey describes the previous research carried out by the researcher in the field of Recent Trends in Industrial Automation. The researches were carried out considering the outcome as specific technology in industrial automation. This paper represents the description of their research in the way of analysis of Recent Trends in Industrial Automation.

Vicent Rutagangibwa and Babu Krishnamurthy [2]. This paper proposes an alternative implementation approach using FreeRTOS platform that can act as a benchmark for time bound services. Their research helps in having a hybrid system that can work with PLCs and/or where possible replace PLCs for deterministic service delivery

Binay Kumar and Vineet Gupta [3], This paper attempts to make an in depth investigations on the topic Industries automation focuses more on the aspects of cost effective automation, as full automation is not reachable by every small and medium scale industries.

III. STUDIES AND FINDINGS

The demand of automation systems that utilize hardware, software and communication infrastructure to meet real time constraints are highly needed in today's industrial system.

Advantages of Automation System:

1. To increase productivity
2. To provide optimum cost of operation
3. To improve product quality
4. To reduce routine manual checking

Hierarchy of an Industrial Automation System:

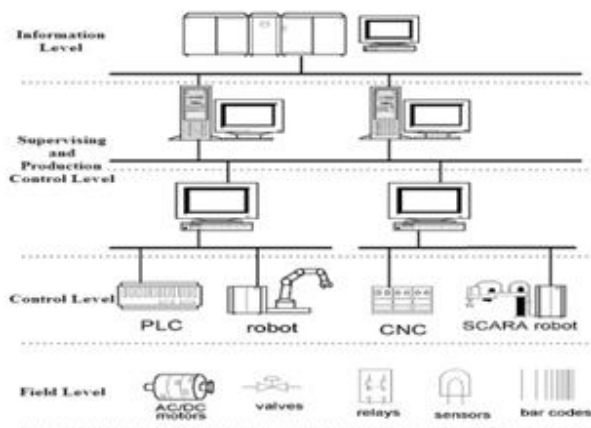


Fig1. Hierarchy of an Industrial Automation System

Field Level: It is the lowest level of the automation hierarchy which includes the field devices like sensors and actuators. The main task of these field devices is to transfer the data of processes and machines to the next higher level for monitoring and analysis. And also it includes the controlling of process parameter through actuators. For instance, we can describe this level as eyes and arms of a particular process.

Sensors convert the real time parameters like temperature, pressure, flow, level, etc into electrical signals. This sensor data further transferred to the controller so as to monitor and analyze the real time parameters. Some of the sensors include thermocouple, proximity sensors, RTDs, flow meters, etc.

On other hand actuators converts the electrical signals (from the controllers) into mechanical means to control the processes. Flow control valves, solenoid valves, pneumatic actuators, relays, DC motors and servo motors are the examples of actuators.[4]

Control Level: This level consists of various automation devices like CNC machines, PLCs, etc., which acquires the process parameters from various sensors. The automatic controllers drive the actuators based on the processed sensor signals and program or control technique.[5]

Supervising and Production Control Level: In this level, automatic devices and monitoring system facilitates the controlling and intervening functions like Human Machine Interface (HMI), supervising various parameters, setting production targets, historical archiving, setting machine start and shutdown, etc. Mostly, either Distribution Control System (DCS) or Supervisory Control and Data Acquisition (SCADA) HMIs are popularly used in this level.

Information or Enterprise Level: This is the top level of the industrial automation which manages the whole automation system. The tasks of this level include production planning, customer and market analysis, orders and sales, etc. So it deals more with commercial activities and less with technical aspects. Also industrial communication networks are most prominent in industrial automation systems which transfer the information from one level to the other. So these are present in all the levels of automation system to provide continuous flow of information. This communication network can be different one level to the other. Some of these networks include RS485, CAN, Device-Net, Foundation Field bus, Profibus, etc.

From the above hierarchy we can conclude that there is continuous information flow from high level to low level and vice-versa. If we assume this graphical way, it is like a pyramid in which as we go up, the information gets aggregated and while going down, we get detailed information about the process.[4][3]

Applications of Industrial Automation:

1. Food and Drinking:-The food retail industry has started to apply automation to the ordering process.
2. Stores:-Many supermarkets and even smaller stores are rapidly introducing Self checkout systems reducing the need for employing checkout workers
3. Automated Mining:-Automated mining involves the removal of human labor from the mining process
4. Automated Waste Management :-Automated waste collection trucks prevent the need for as many workers as well as easing the level of labor required to provide the service

Types of Industrial Automation:

*** Fixed Automation :** Fixed automation systems are utilized in high volume production settings that have dedicated equipment. The equipment has fixed operation sets and is designed to perform efficiently with the operation sets. This type of automation is mainly used in discrete mass production and continuous flow systems like paint shops, distillation processes, transfer lines and conveyors. All these processes rely on mechanized machinery to perform their fixed and repetitive operations to achieve high production volumes.

***Programmable Automation:** Programmable automation systems facilitate changeable operation sequences and machine configuration using electronic controls. With programmable automation, non-trivial programming efforts are required to reprogram sequence and machine operations. Since production processes are not changed often,

programmable automation systems tend to be less expensive in the long run. This type of system is mainly used in low job variety and medium-to-high product volume settings. It may also be used in mass production settings like paper mills and steel rolling mills.

***Integrated Automation:** Integrated industrial automation involves the total automation of manufacturing plants where all processes function under digital information processing coordination and computer control. It comprises technologies like:

- Computer-aided process planning
- Computer-supported design and manufacturing
- Flexible machine systems
- Computer numerical control machine tools
- Automated material handling systems, like robots
- Automatic storage and retrieval systems
- Computerized production and scheduling control
- Automated conveyors and cranes

IV. CONCLUSION

The paper gives a literature review on exiting industrial automation system. Here we propose efficient industry automation system that allows user to efficiently control industry appliances/machines by different type of Automation system Digitalization is changing our world, Totally Integrated Automation (TIA) offers everything needed to manufacturing companies to ensure their long-term competitiveness.

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