A graphic featuring a black and white photograph of electronic components, including integrated circuits and a potentiometer, mounted on a printed circuit board. The image is partially obscured by a large black circle on the left and a red triangle on the right. The text "INDUSTRIAL AUTOMATION" is written in red capital letters inside the black circle.

INDUSTRIAL AUTOMATION

MEMBERS

❑ TUSHAR SWAMI

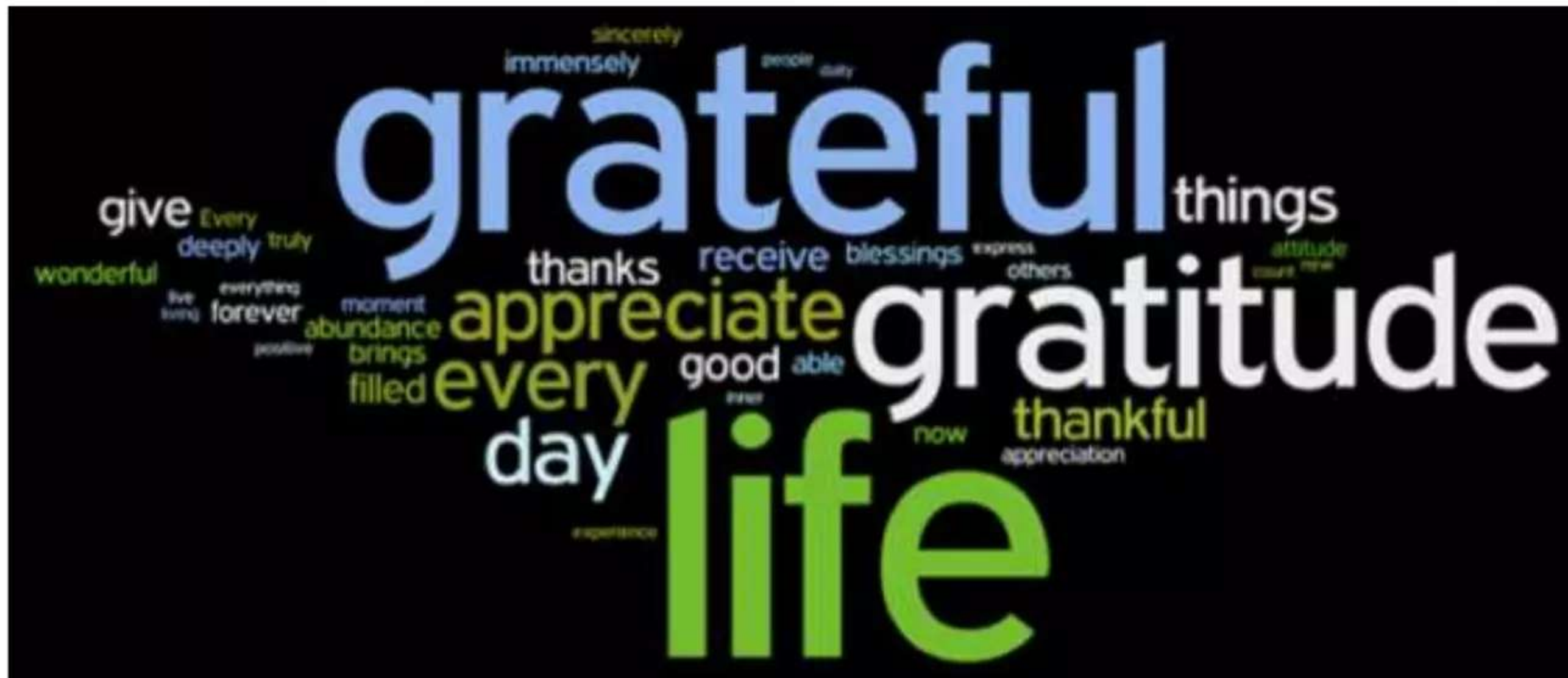
❑ VIKAS PRASAD

❑ TANISH GARG



ACKNOWLEDGEMENT

We would like to express our special thanks of gratitude to our teacher **Dr. Vandana** who gave us the golden opportunity to present this wonderful presentation on the topic **(Industrial Automation)**, which also helped us in doing a lot of Research and we came to know about new things. We are really thankful to her.



WHAT IS AUTOMATION?

Automation is basically the delegation of human control function to technical equipment for



Increasing Productivity



Increasing Quality



Reducing Cost



Increasing Safety in
working conditions

TYPES OF AUTOMATION

Building



Light



Scientific

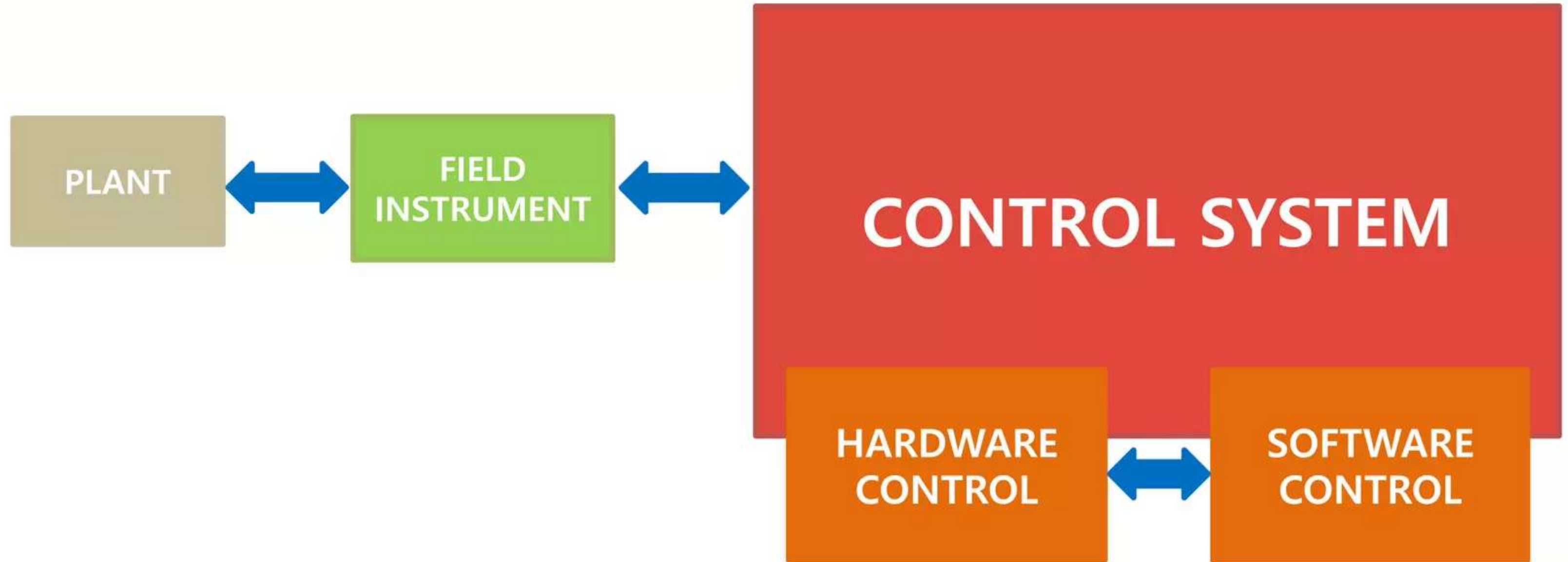


Industrial



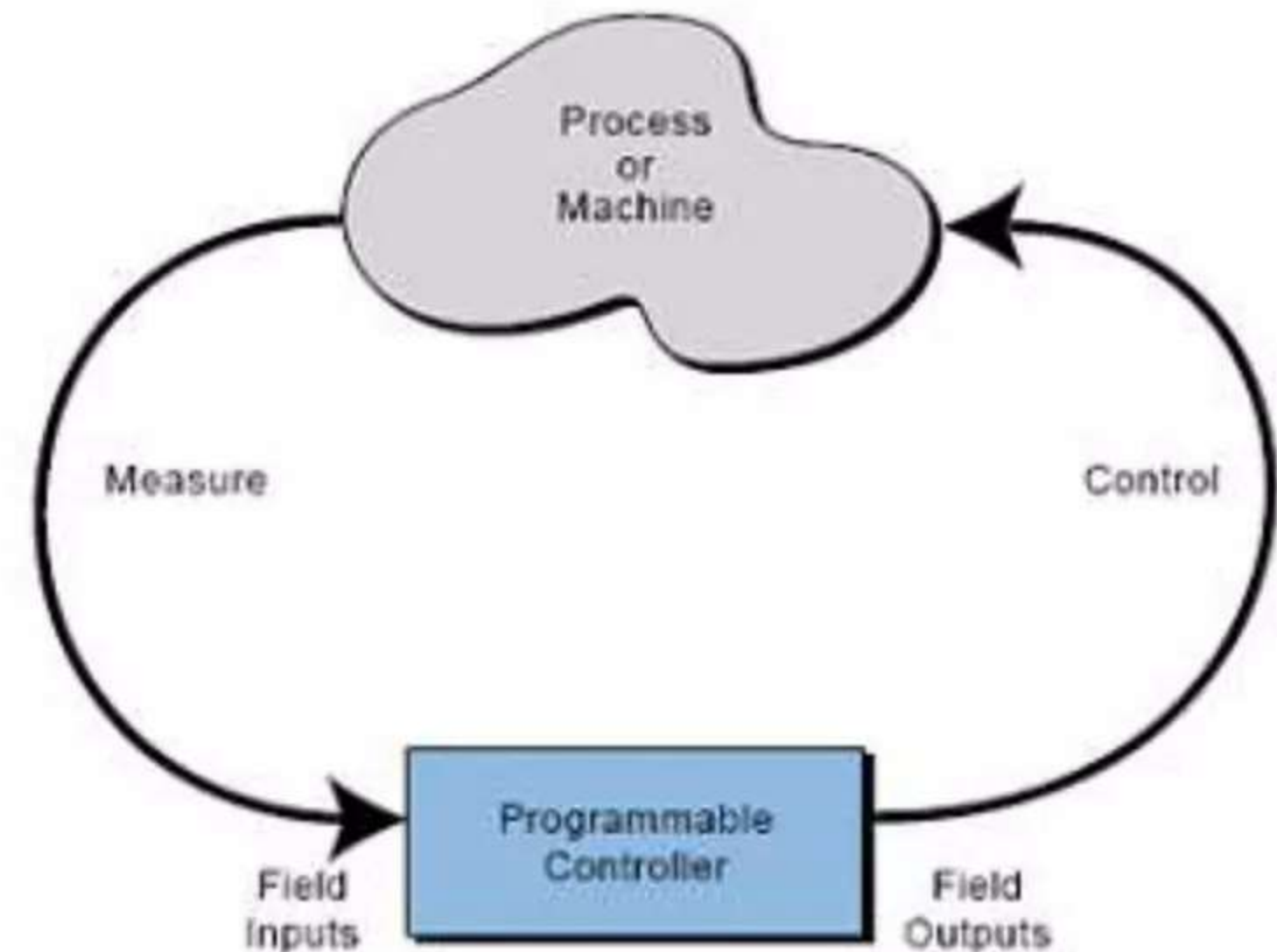
INDUSTRIAL AUTOMATION

- use of control systems, such as computers or robots, and information technologies
- for handling different processes and machineries



Programmable Logic Controller

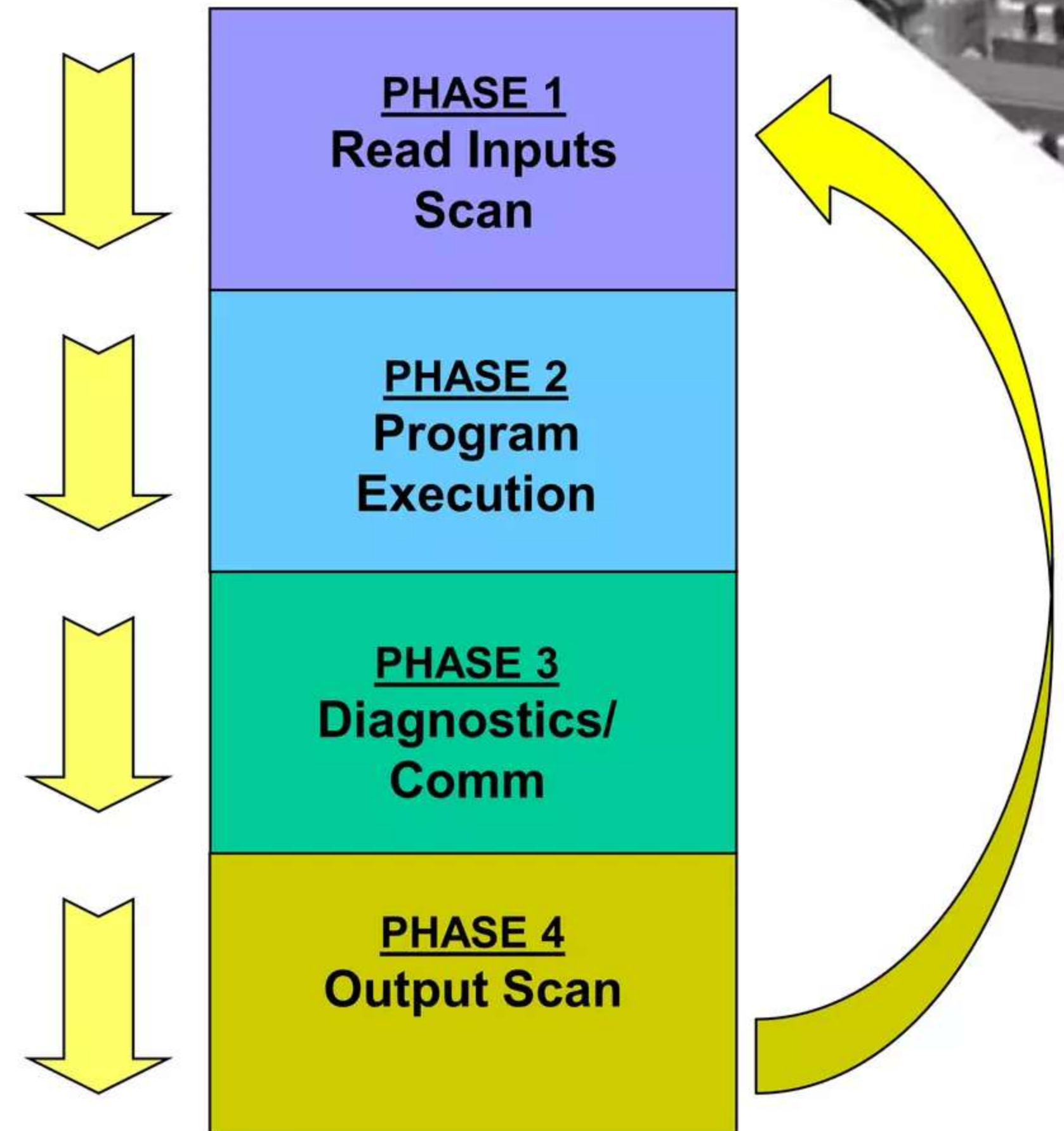
- industrial computer that monitors inputs and makes decisions
- based on its program and controls outputs to automate a process
- specialized to handle incoming events in real-time
- PLC is a **digital computer** designed for **multiple inputs and output** arrangements
- it has input lines where sensors are connected to notify upon events
- and output lines to signal any reaction to the incoming events
- uses a programmable memory to store the instructions



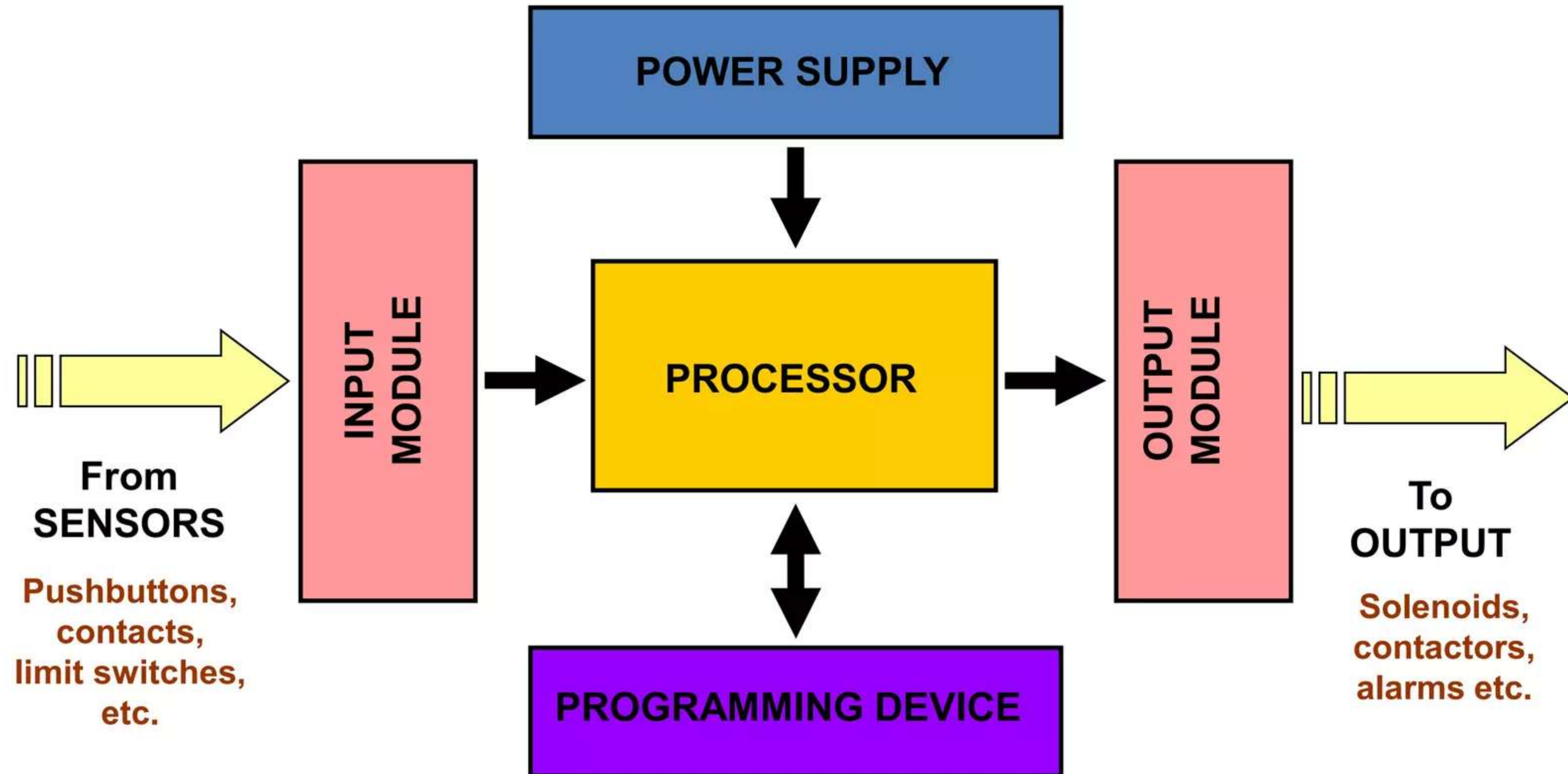
PLC SCAN CYCLE & SCAN TIME

While the PLC is running, the scanning process include the four phases, which are repeated continuously as individual cycles of operation:

1. **Input Scan-** Scan the state of the Inputs
2. **Program Execution-** Processes and executes the program logic
3. **Housekeeping-** This step includes communication, Internal Diagnostics, etc.
4. **Output Scan-** Energize/de-energize the outputs



MAJOR COMPONENTS OF PLC

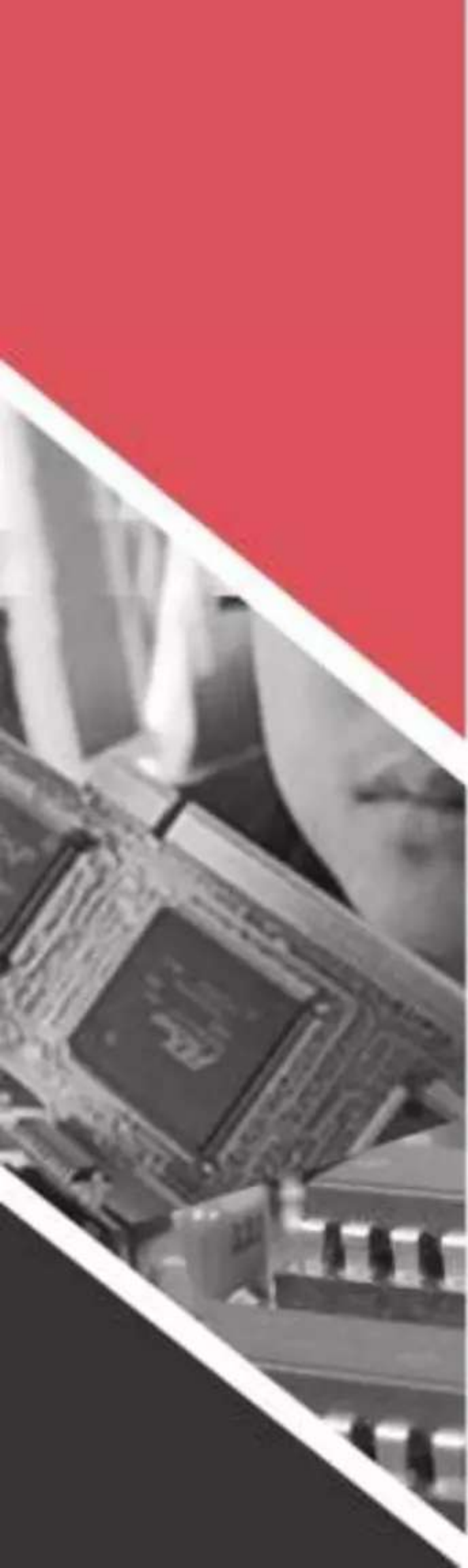




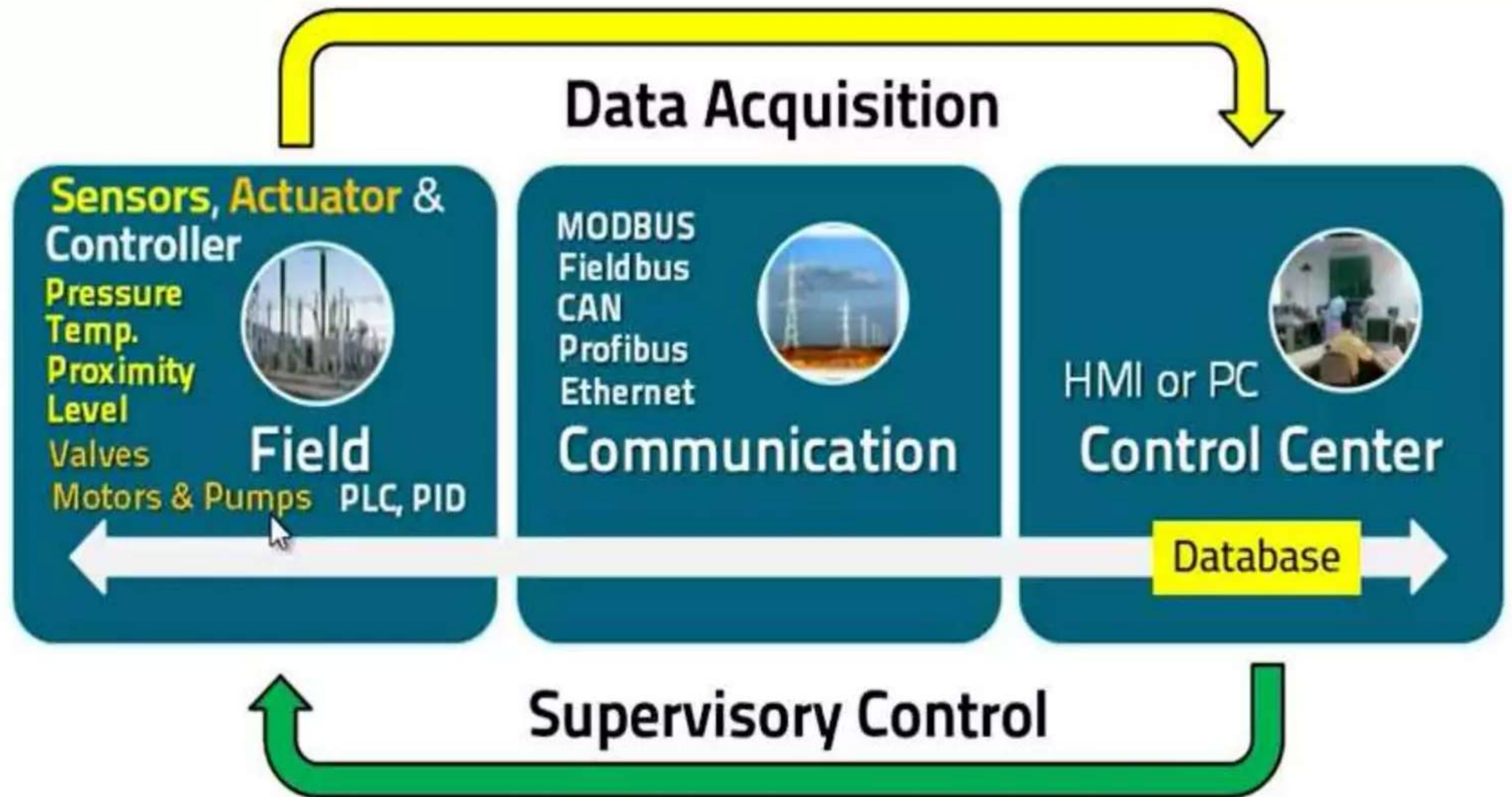
s c a d a

SCADA

- **Supervisory control and data acquisition (SCADA)** is a control system architecture that uses computers, networked data communications and graphical user interfaces for high-level process supervisory management.
- SCADA is a category of software application program for process control, the gathering of data in real time from remote locations in order to control equipment and conditions.
- SCADA systems include hardware and software components.



SCADA



Components of SCADA System

A SCADA system usually consists of the following main elements:

1. Supervisory computers

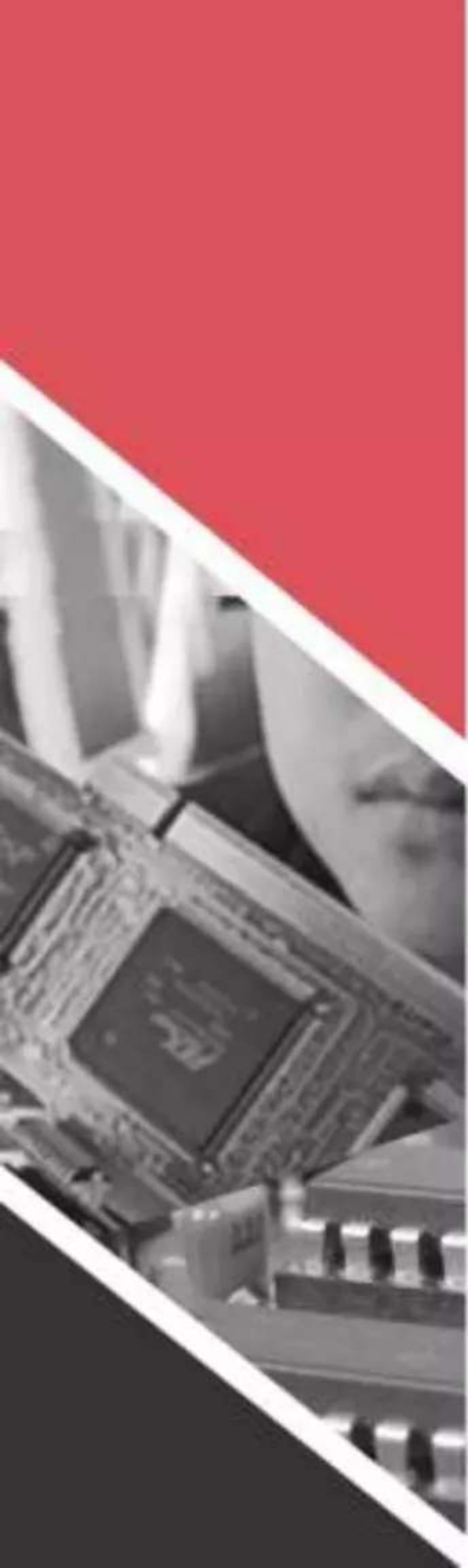
This is the core of the SCADA system, gathering data on the process and sending control commands to the field connected devices. It refers to the computer and software responsible for communicating with the field connection controllers.

2. Remote terminal units (RTUs)

Remote terminal units, also known as (RTUs), connect to sensors and actuators in the process, and are networked to the supervisory computer system.

3. Programmable logic controllers (PLCs)

These are connected to sensors and actuators in the process, and are networked to the supervisory system and are programmed in one or more IEC 61131-3 programming languages.

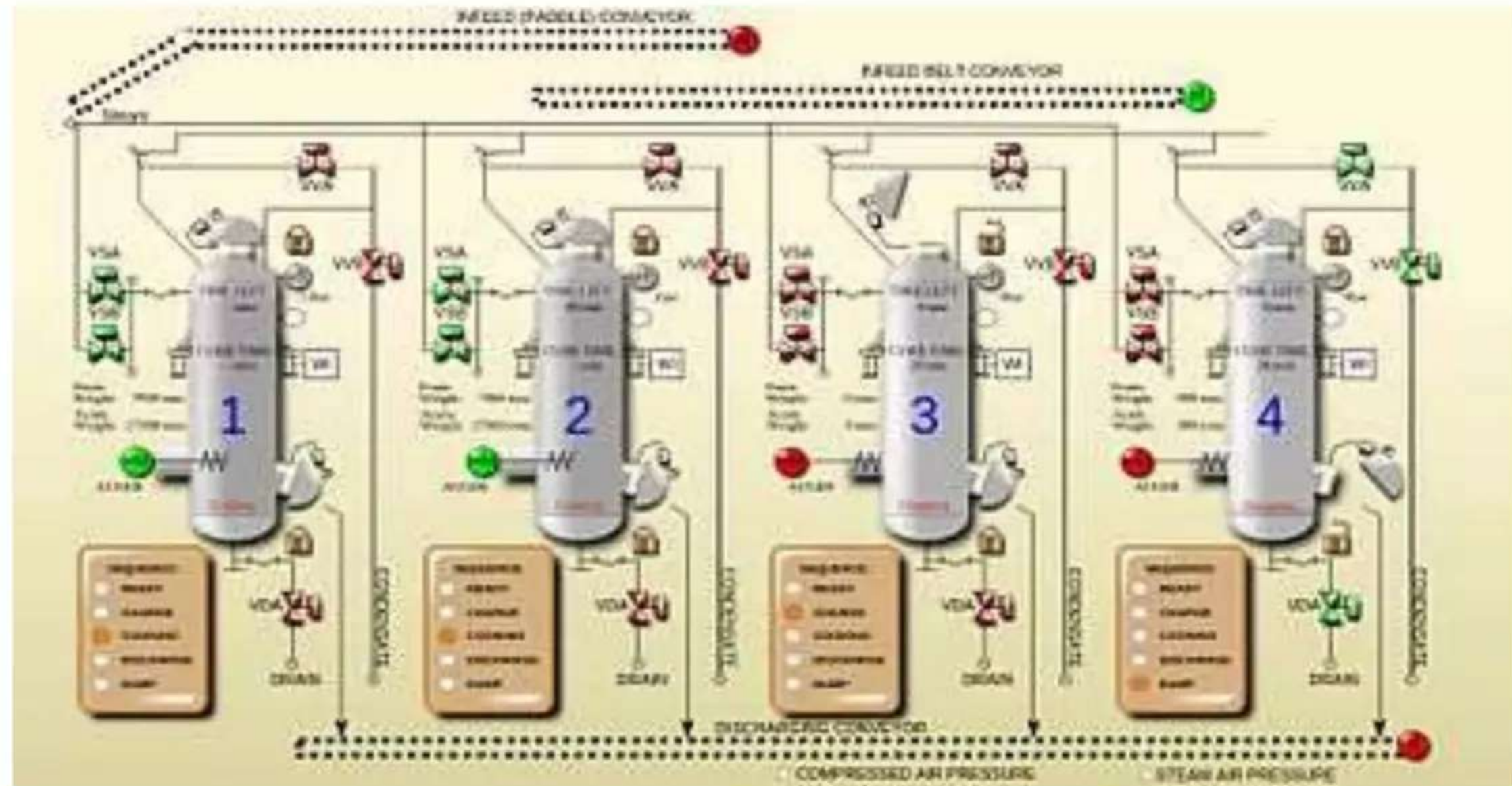


4. Communication infrastructure

This connects the supervisory computer system to the remote terminal units and PLCs example Cables And Ethernet.

5. Human-machine interface(HMI or GUI)

The human-machine interface (HMI) is the operator window of the supervisory system.



SCADA Architecture

Control Centre



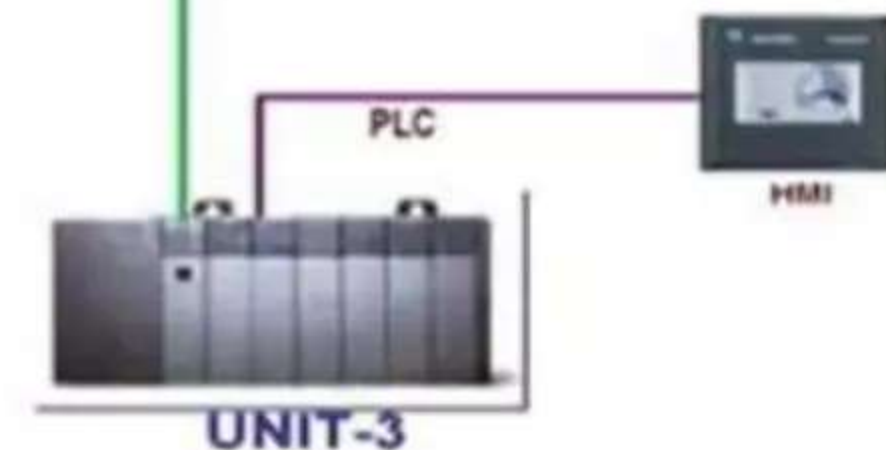
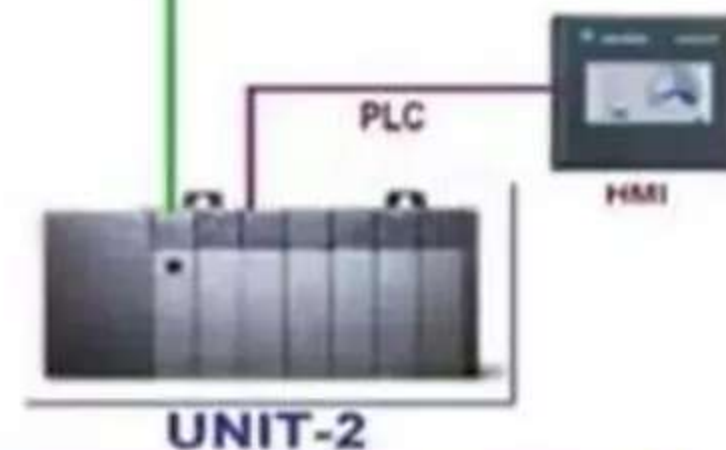
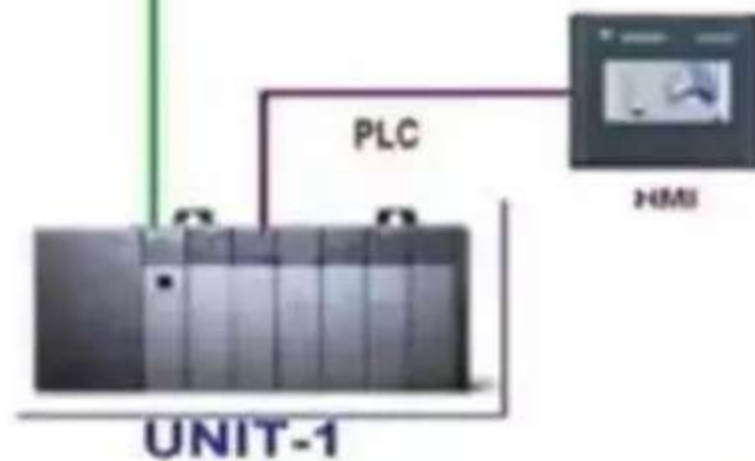
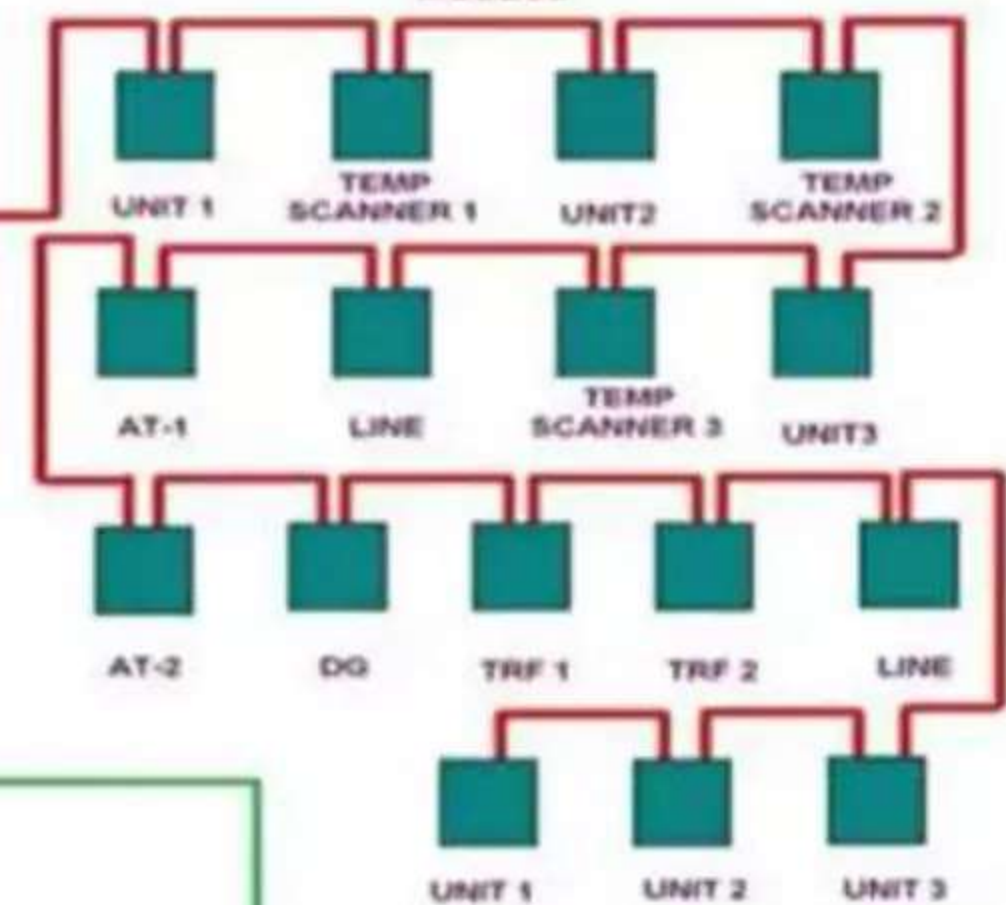
MAIN HUB

(RELAY READER)

Communication Network

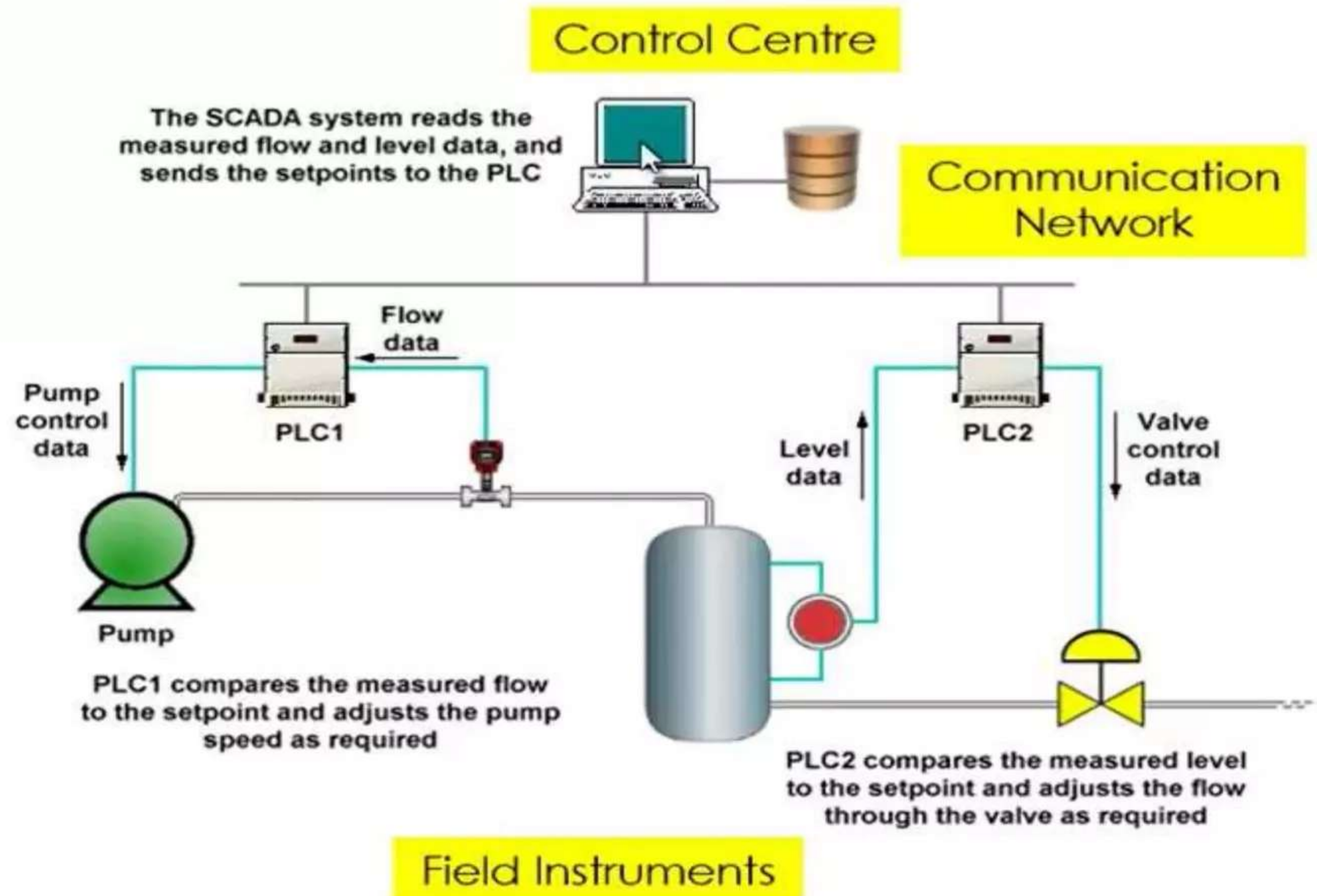
Field Instruments

MODBUS



Field Instruments

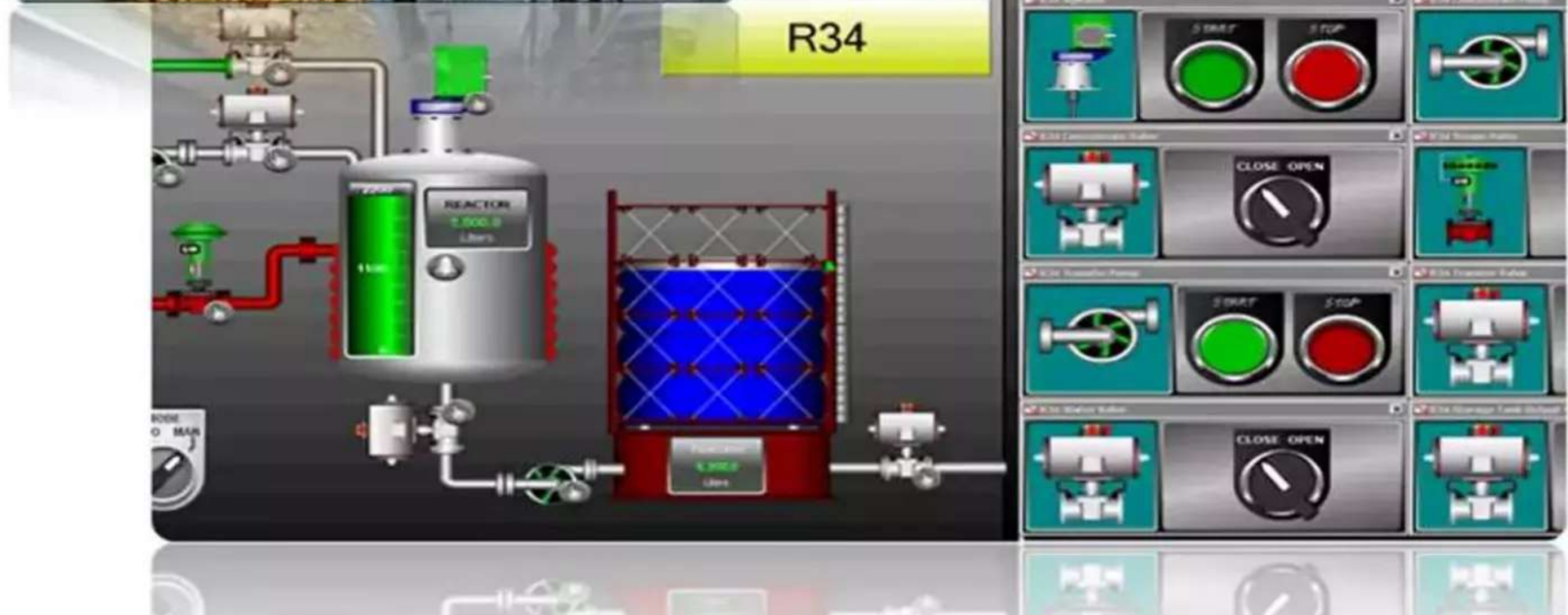
Example



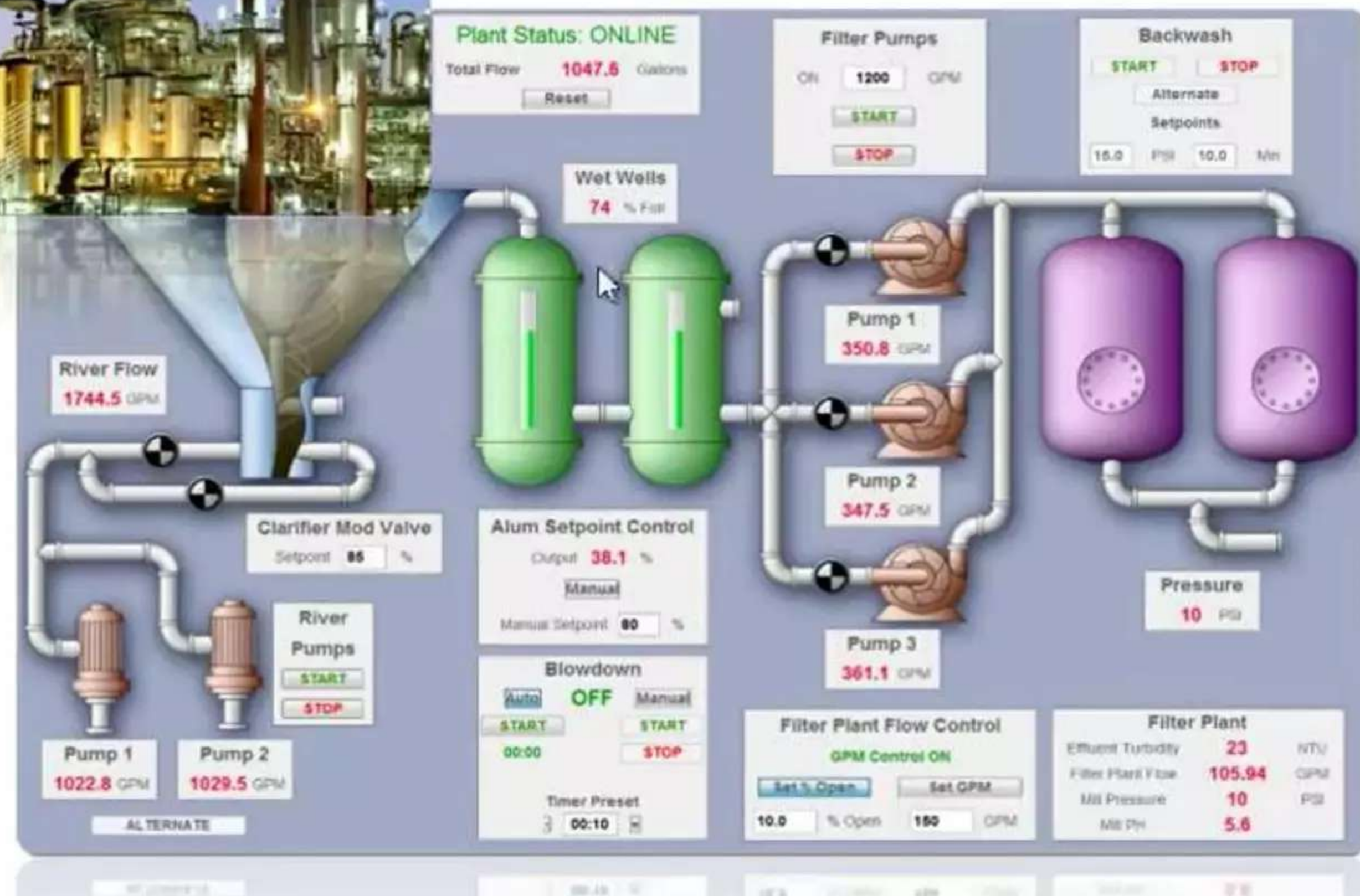
APPLICATIONS



Food Processing Industry



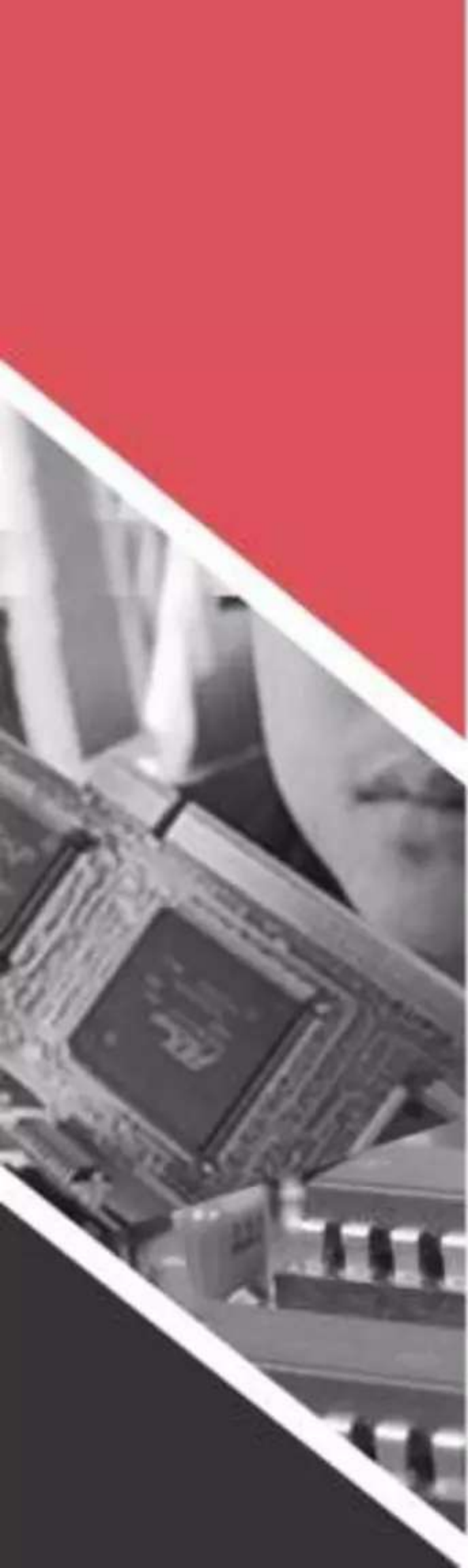
Chemical Industry

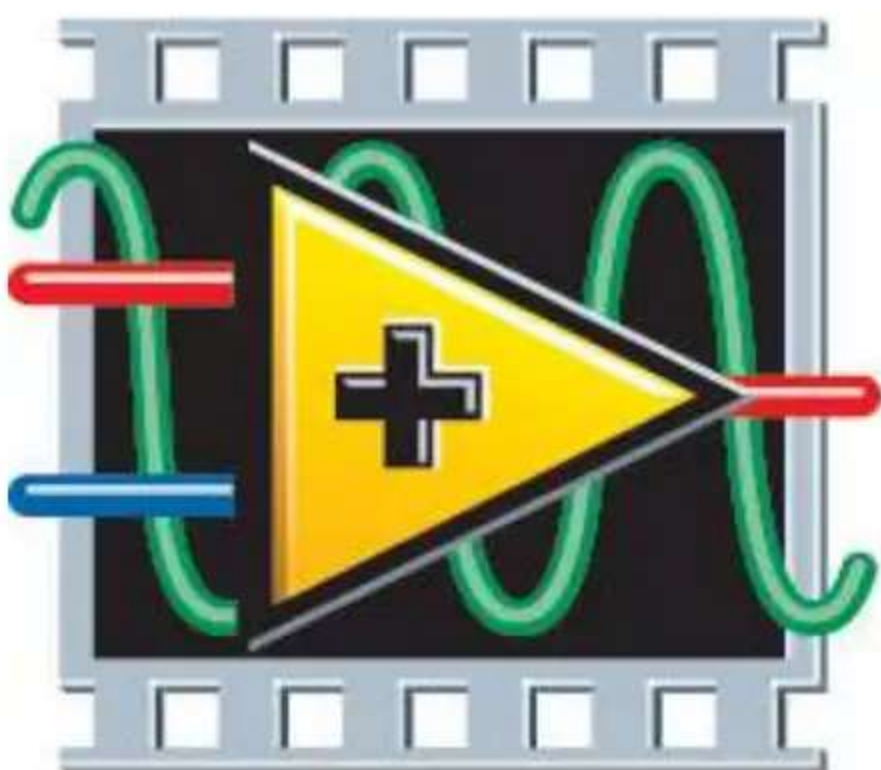


ALARM HANDLING

An important part of most SCADA implementations is alarm handling. The system monitors whether certain alarm conditions are satisfied, to determine when an alarm event has occurred.

Once an alarm event has been detected, one or more actions are taken (such as the activation of one or more alarm indicators, and perhaps the generation of email or text messages so that management or remote SCADA operators are informed).





NATIONAL INSTRUMENTS

LabVIEW™



CERTIFIED ARCHITECT

INTRODUCTION

- **L**aboratory **V**irtual Instrument **E**ngineering **W**orkbench, is a programming environment in which you create programs using a graphical notation
- Increase your productivity by orders of magnitude,
- it is specifically designed to take measurements, analyze data & present results to the user

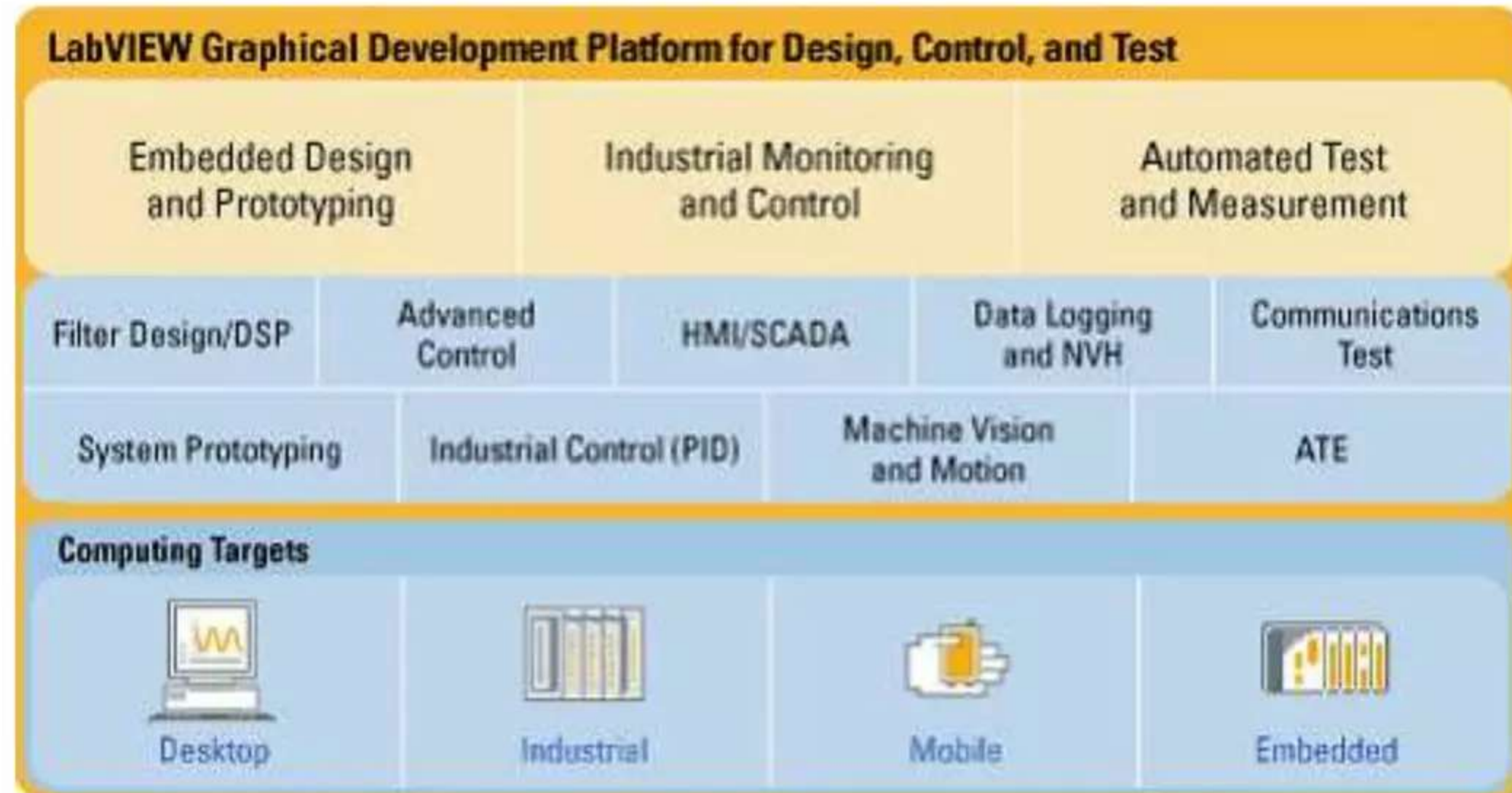
Table 1.1. LabVIEW Terms and Their Conventional Equivalents

<i>LabVIEW</i>	<i>Conventional Language</i>
VI	program
function	function or method
subVI	subroutine, subprogram, object
front panel	user interface
block diagram	program code
G	C, C++, Java, Pascal, BASIC, etc.



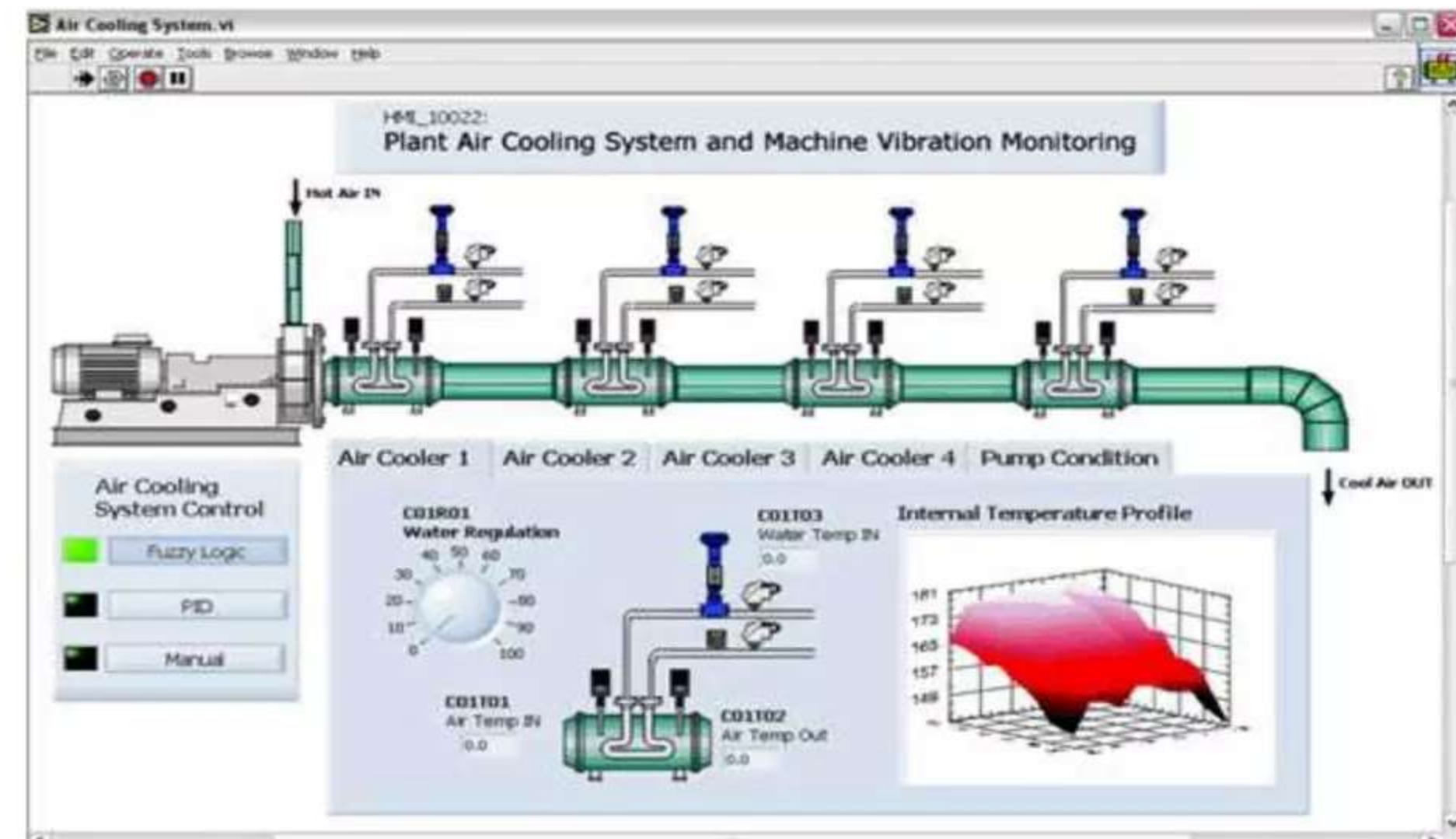
WHY LabVIEW

- Complements PLCs by incorporating PC and embedded technologies
 - ❖ real-time analysis, monitoring, advanced control, and predictive maintenance.
- Supports OLE for Process Control (OPC) for information exchange



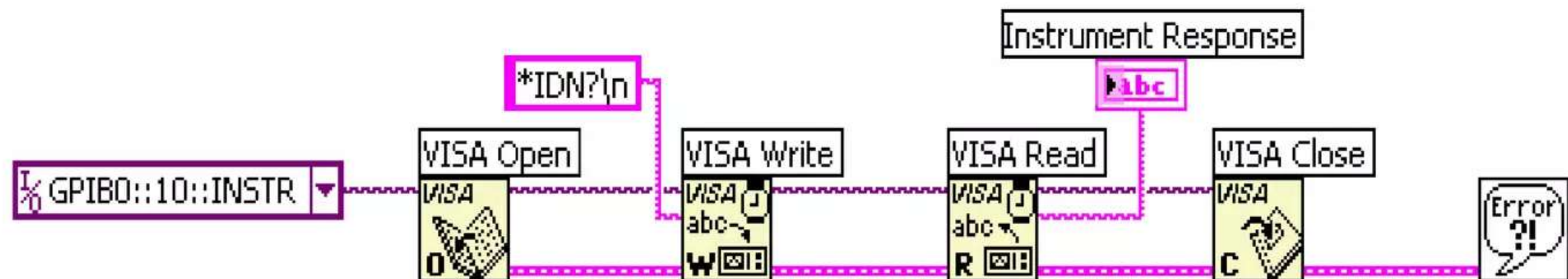
- For High-Speed Measurements from a Broad Range of Sensors
 - Acquire and generate signals from plug-in boards, USB devices, and Ethernet-based systems.
 - Special data types and measurement analysis functions
 - Measurements from physical sensors as quickly and easily as possible
- For Data Logging
 - Utilities for data logging and alarm management, real-time and historical trending.
 - The historical data is stored in database, so you can use standard data extraction tools to retrieve the information for use in other parts of the enterprise
- For Developing Graphical User Interfaces

LabVIEW makes it easy to create human-machine interface applications for remote monitoring and control. LabVIEW provides hundreds of objects for developing a professional user interface: graphs, charts, knobs, dials, thermometers, and more.



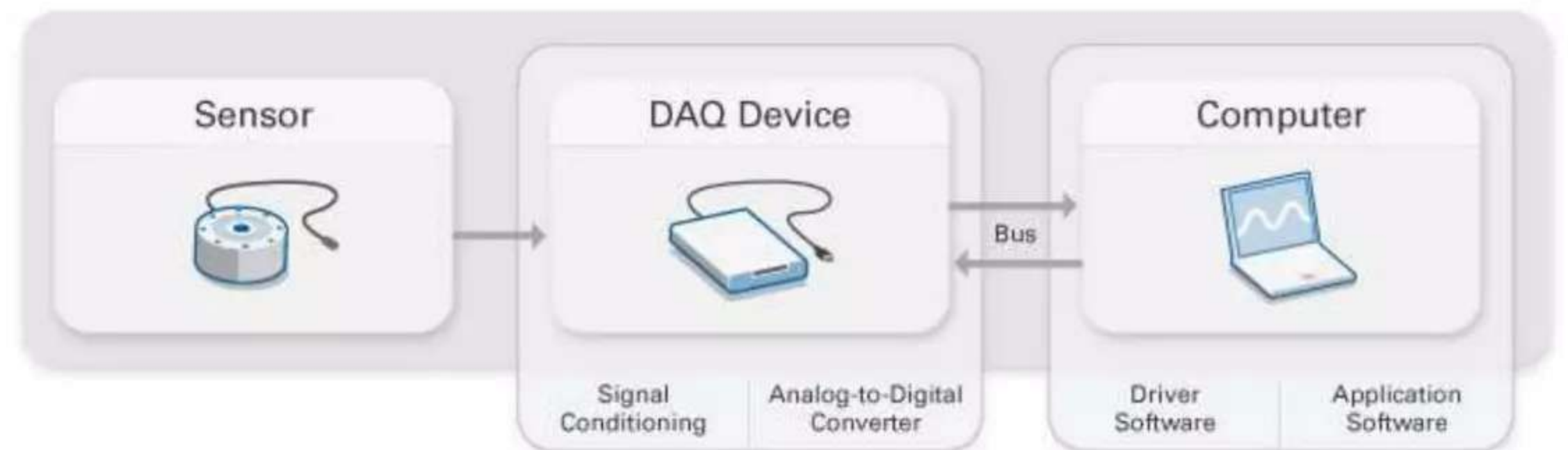
VISA

- The Virtual Instrument Software Architecture (VISA)
- standard for configuring, programming, and troubleshooting instrumentation systems comprising GPIB, VXI, PXI, Serial, Ethernet, and/or USB interfaces
- VISA provides the programming interface between the hardware and development environments



DAQ

- Data acquisition (DAQ) is the process of measuring an electrical or physical phenomenon such as voltage, current, temperature, pressure, or sound with a computer.
- A DAQ system consists of sensors, DAQ measurement hardware, and a computer with programmable software.
- DAQ systems exploit the processing power, productivity, display, and connectivity capabilities of industry-standard computers providing a more powerful, flexible, and cost-effective measurement solution.



CONCLUSION

PROS

Replaces hard physical work

Tasks in hazardous environments

Faster production and cheaper labour costs

Automation maintained with simple quality checks

CONS

Initial costs are high

Some tasks expensive to automate





Summary



Explained about the interfacing of various industrial machines with myriad logical controllers.

Since “**MAKE IN INDIA**” campaign is on the rage right now.

Industrial Automation – ever-growing field

Fair employment chances for Engineers with knowledge about the working of machines, and programming languages and software like:

- MATLAB
- Python
- C#
- Java, etc.

REFERENCES

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