PELMOB

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PLC Circuits and Actuators in Mechatronic

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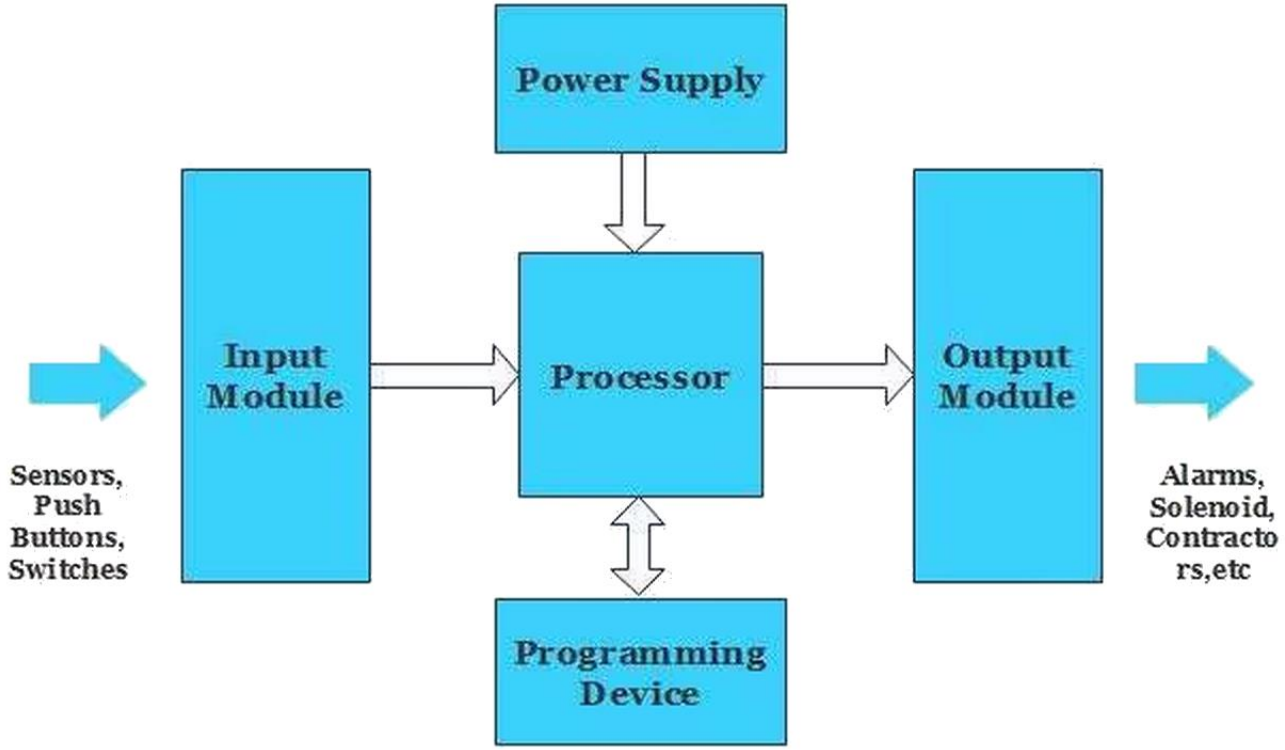
PROGRAMMABLE LOGIC CONTROLLER

- A programmable Logic Controller(PLC) is a specialized digital computer employed in industrial settings for automation and control.
- PLCs play a pivotal role in industrial automation, efficiently managing machinery and processes.
- They receive data from sensors, execute programmed logic, and control actuators, enhancing precision and reducing manual intervention.

PLC BLOCK DIAGRAM

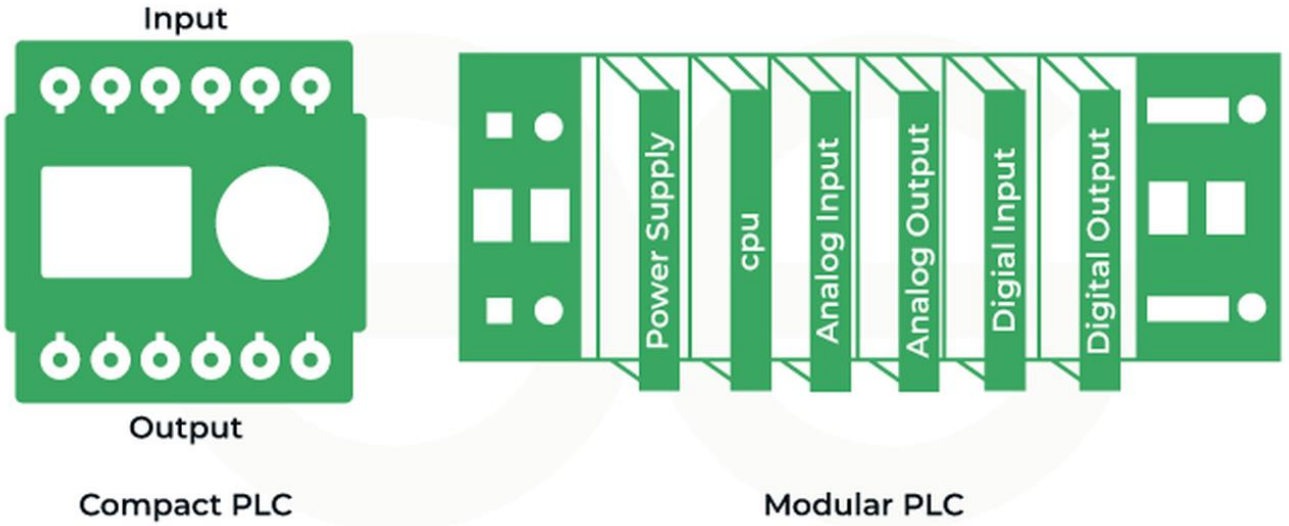


MAIN COMPONENTS OF A PLC

- Processor
- Memory(RAM/ ROM)
- Input device
- Output device
- Power supply
- Programming device

TYPES OF A PLC

- Compact PLC
- Modular PLC
- Rack-Mount PLC



ADVANTAGE AND DISADVANTAGES OF PLC

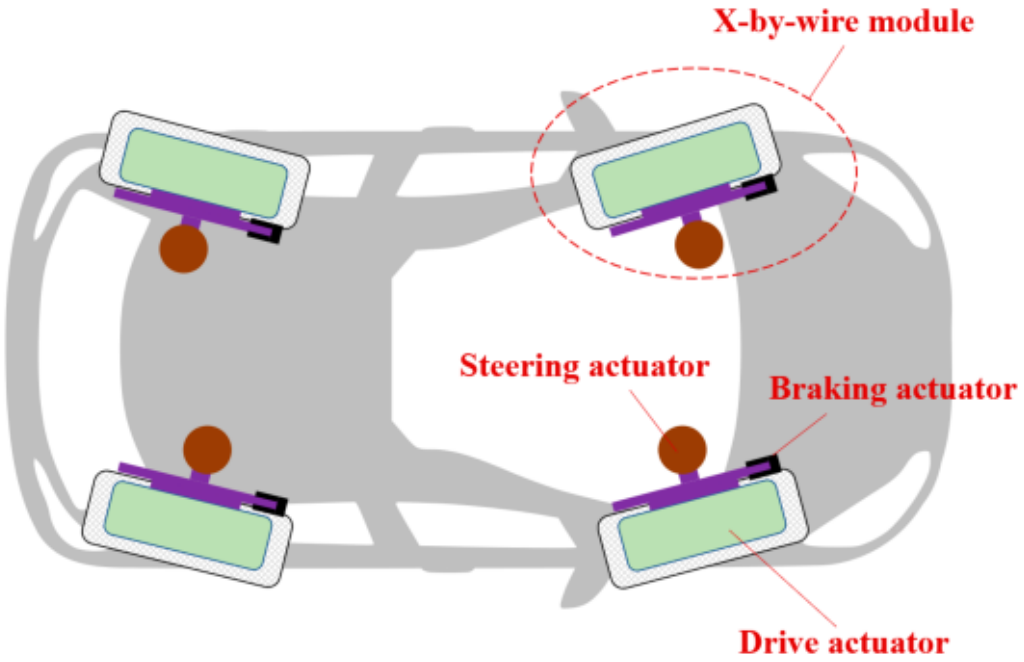
Advantages	Disadvantages
• Flexibility and Reliability	• Initial cost
• Programming	• May require extensive algorithm and program
• High Speed Operation	• Software update on older PLC
• Monitoring system	• Scalability issue

ROLE OF PLCS IN ELECTRIC VEHICLES

- Motor Control for Vehicle Propulsion
- Battery Energy Management Optimization
- Charging System Control
- Heating, Ventilation, and Air Conditioning (HVAC) System Management

ACTUATORS IN ELECTRIC VEHICLES

- Electric motors for vehicle propulsion
- Linear actuators for adjusting seats, steering wheel, or mirrors
- Charging System Control
- Actuators for managing cabin heating and cooling



APPLICATION EXAMPLES

- **Motor Control**
  - The PLC manages the speed and direction of rotation of the electric motors
- **Charging System**
  - The PLC controls the battery charging process, adjusting voltage and current to battery
- **Cabin Climate Control**
  - Actuators manage the ventilation and heating of the cabin according to parameters set by the PLC

PLC AND ACTUATOR INTEGRATION VIA I/O MODULES

•The Programmable Logic Controller (PLC) receives input signals

•It processes these signals according to programmed logical rules

•Based on the processing, it sends output signals to actuators through its output (O) modules

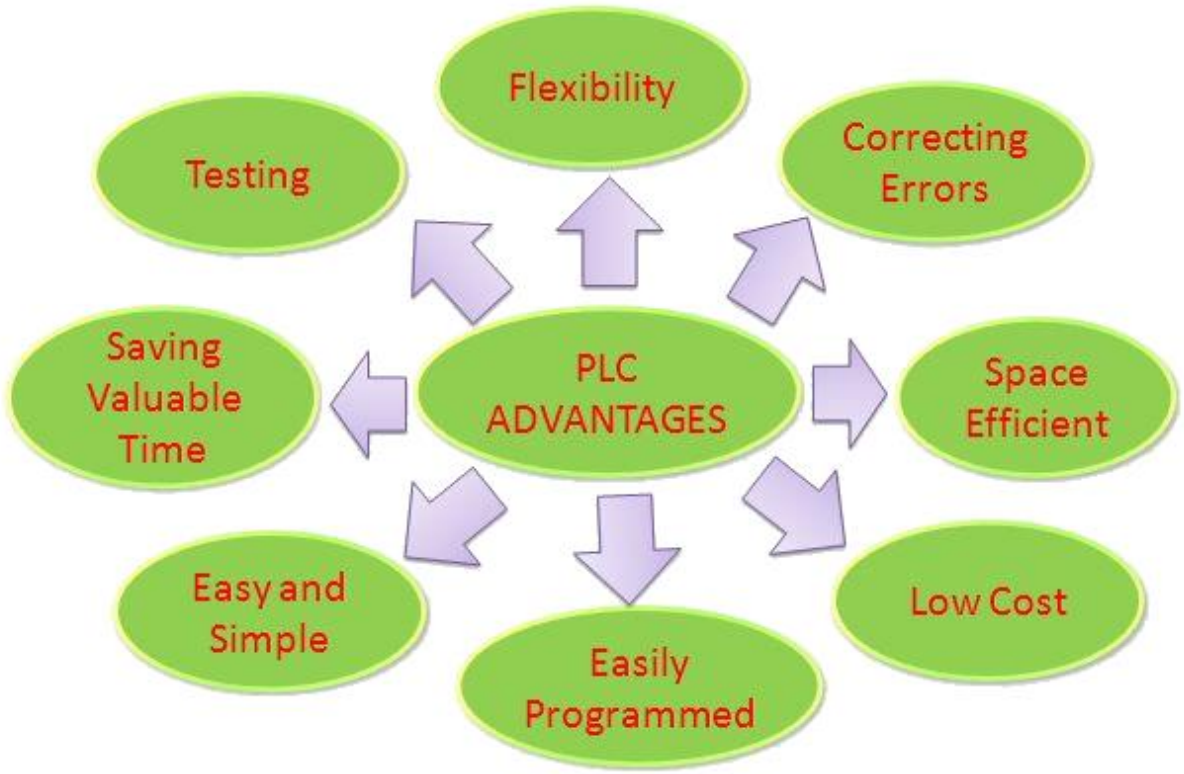
The actuators then perform physical actions, such as:

- activating electric motors,
- adjusting seats
- controlling ventilation systems.

ADVANTAGES OF USING PLCS IN MECHATRONICS

- **Flexibility**
  - PLCs can be easily reprogrammed
- **Reliability**
  - PLCs are designed to operate in harsh industrial environments
- **Easy Programming**
  - PLCs support user-friendly programming languages
- **Cost Reduction**:
  - PLCs offering a more economical solutions by replacing complex relay-based systems

ADVANTAGES OF USING PLCS IN MECHATRONICS



SUMMARY

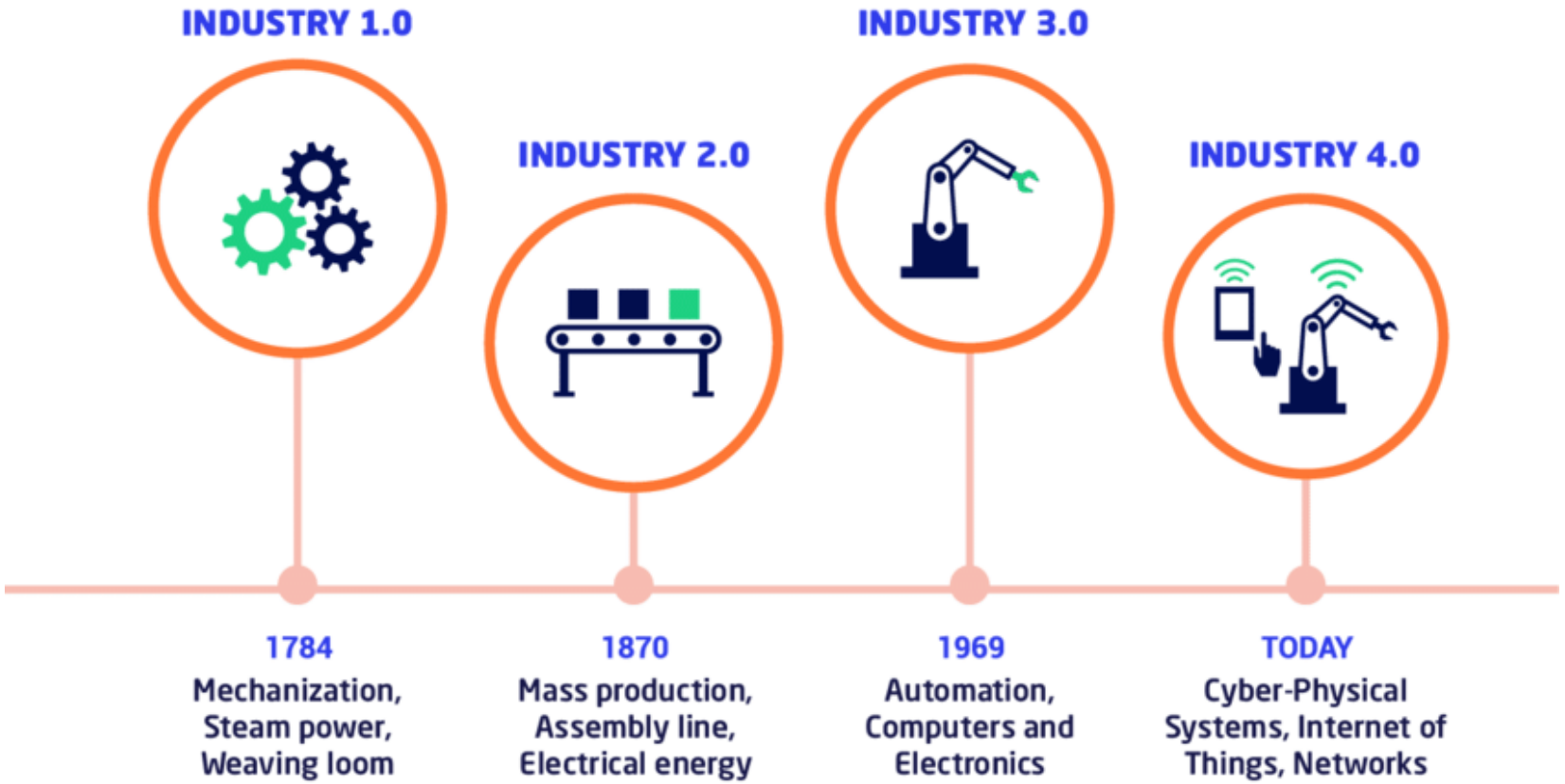
• PLC and actuators: fundamental components in modern mechatronic systems

•Integration of PLCs with actuators: through I/O modules

•Advantages of using PLCs: flexibility, reliability, ease of programming, and cost reduction

•Practical implementation of PLCs: enhancing functionality and performance

INDUSTRY 4.0


INDUSTRY 1.0
INDUSTRY 2.0
INDUSTRY 3.0
INDUSTRY 4.0
1784
Mechanization, Steam power, Weaving loom
1870
Mass production, Assembly line, Electrical energy
1969
Automation, Computers and Electronics
TODAY
Cyber-Physical Systems, Internet of Things, Networks

THANK YOU FOR YOUR ATTENTION!