



SNS COLLEGE OF TECHNOLOGY

Coimbatore-35
An Autonomous Institution

Accredited by NBA – AICTE and Accredited by NAAC – UGC with ‘A+’
Grade Approved by AICTE, New Delhi & Affiliated to Anna University,
Chennai



DEPARTMENT OF AEROSPACE ENGINEERING

19ASZ301– ROBOTICS & AUTOMATION IN SPACE

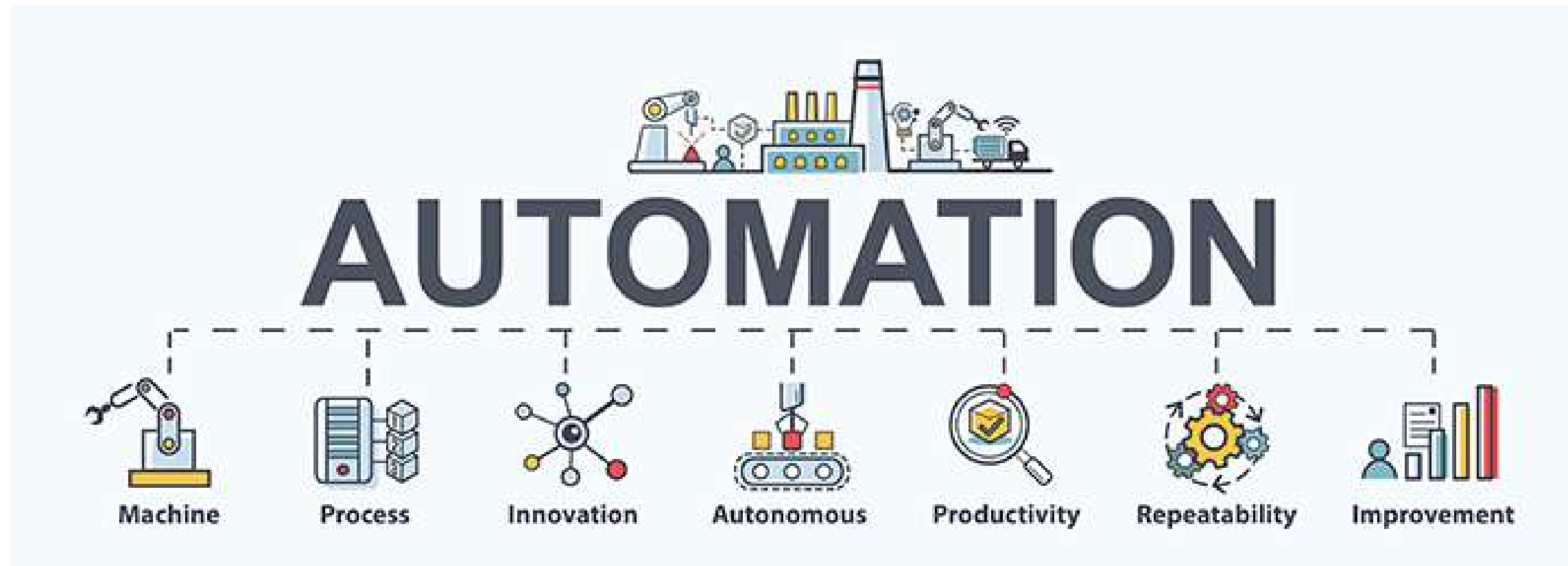
III YEAR VI SEM

UNIT 1 –INTRODUCTION TO AUTOMATION

TOPIC – Basics of automation & Industrial Automation



BASICS OF AUTOMATION



What is Automation?

Automation is the use of technology to perform tasks with reduced human assistance. It aims to improve efficiency, accuracy, safety, and productivity.

Types of Automation

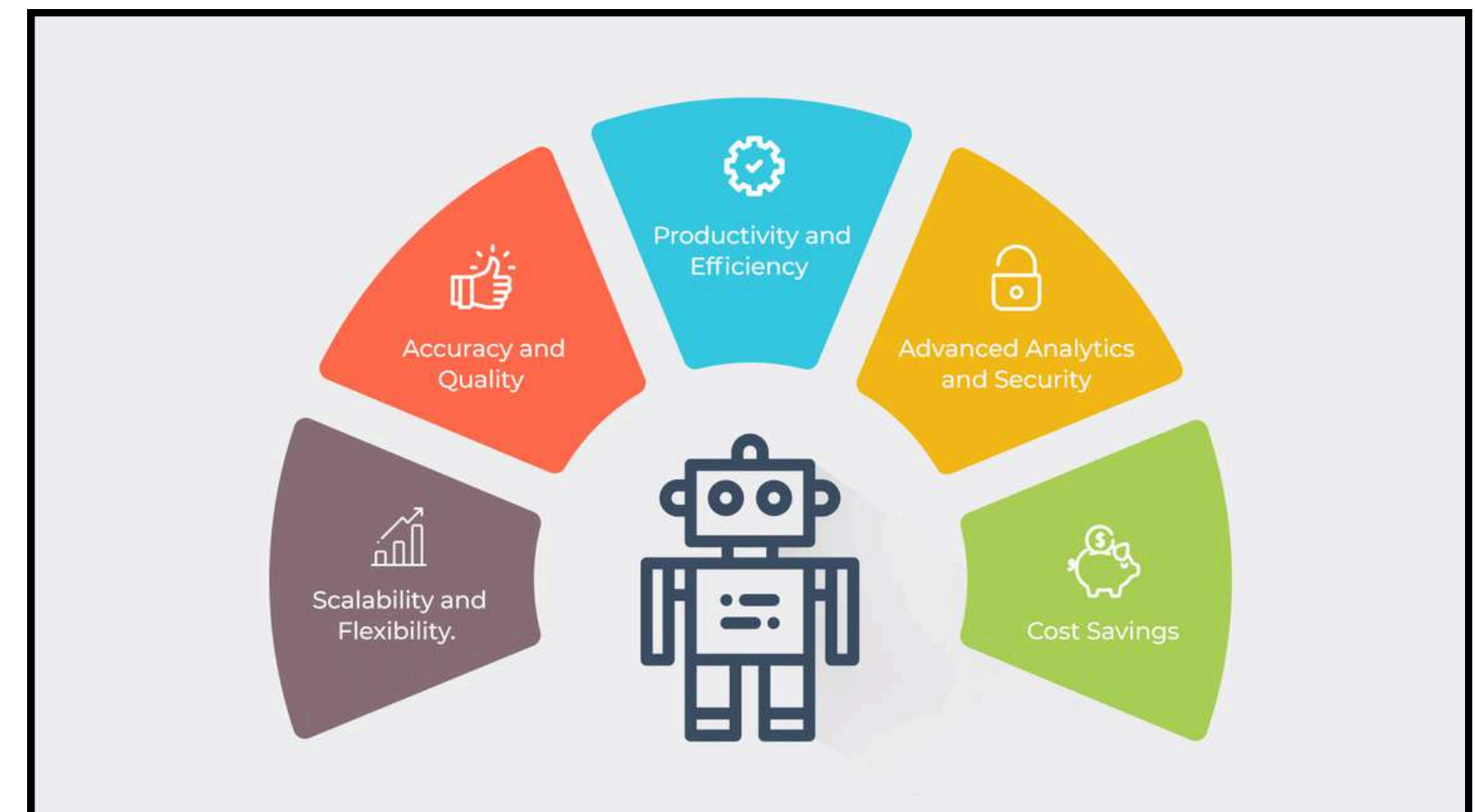
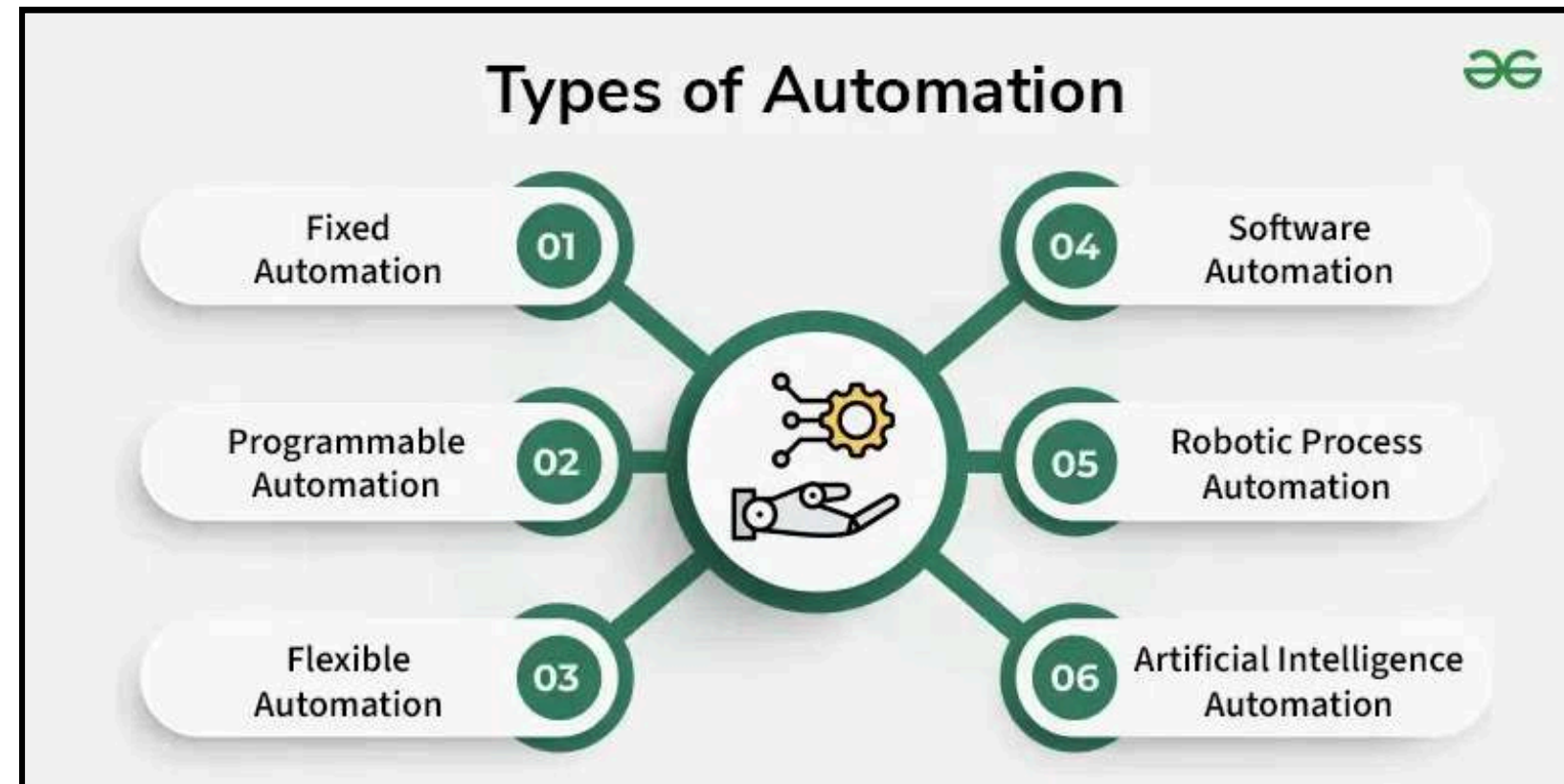
- **Fixed Automation:** Designed for repetitive tasks (e.g., car assembly lines).
- **Programmable Automation:** Allows reprogramming for different tasks (e.g., CNC machines).
- **Flexible (Soft) Automation:** Adapts quickly to changes (e.g., robotics in electronics manufacturing).

Core Components

- **Sensors**
- **Controllers**
- **Actuators**
- **Human-Machine Interface (HMI)**
- **Communication Networks**

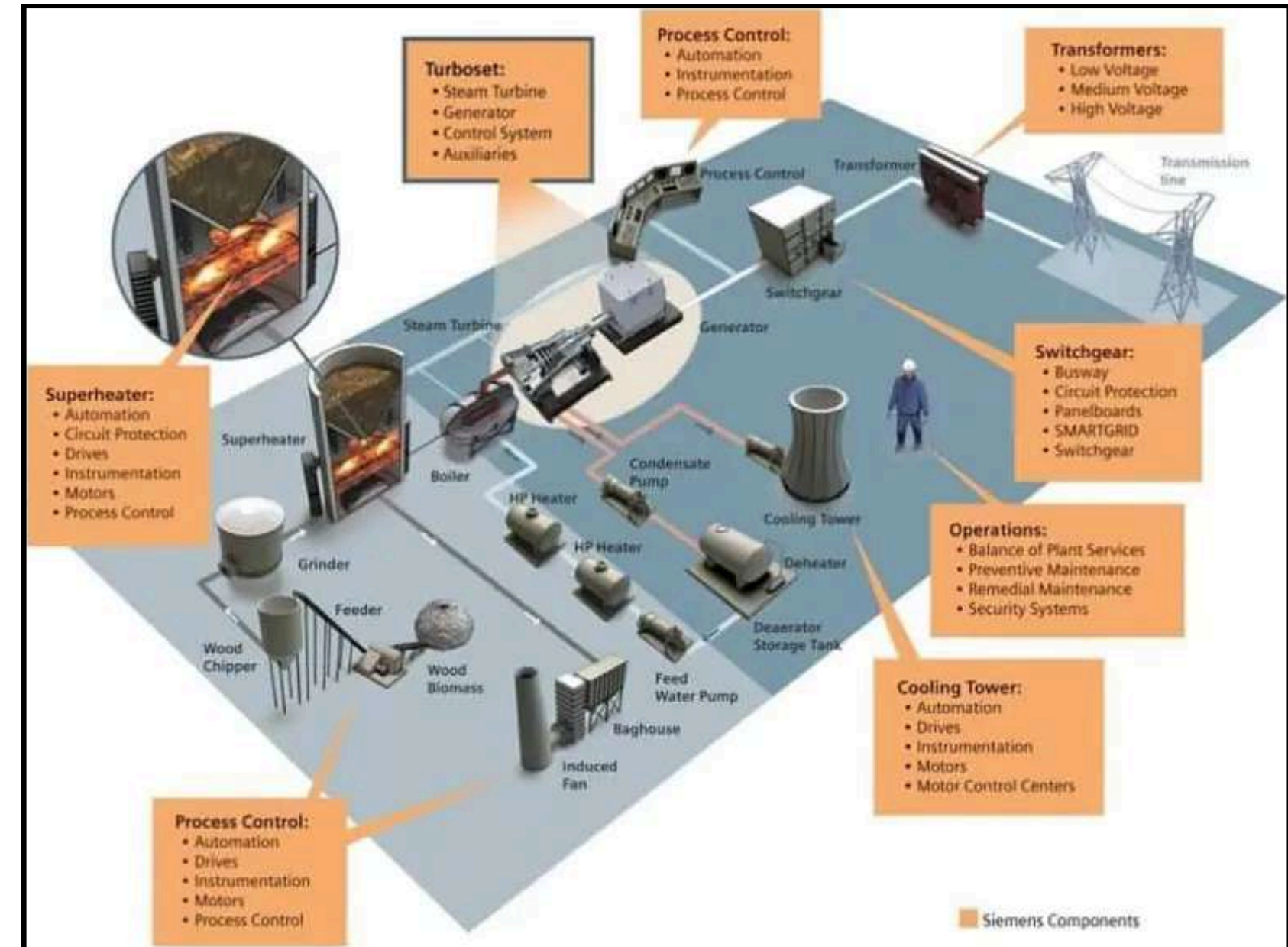
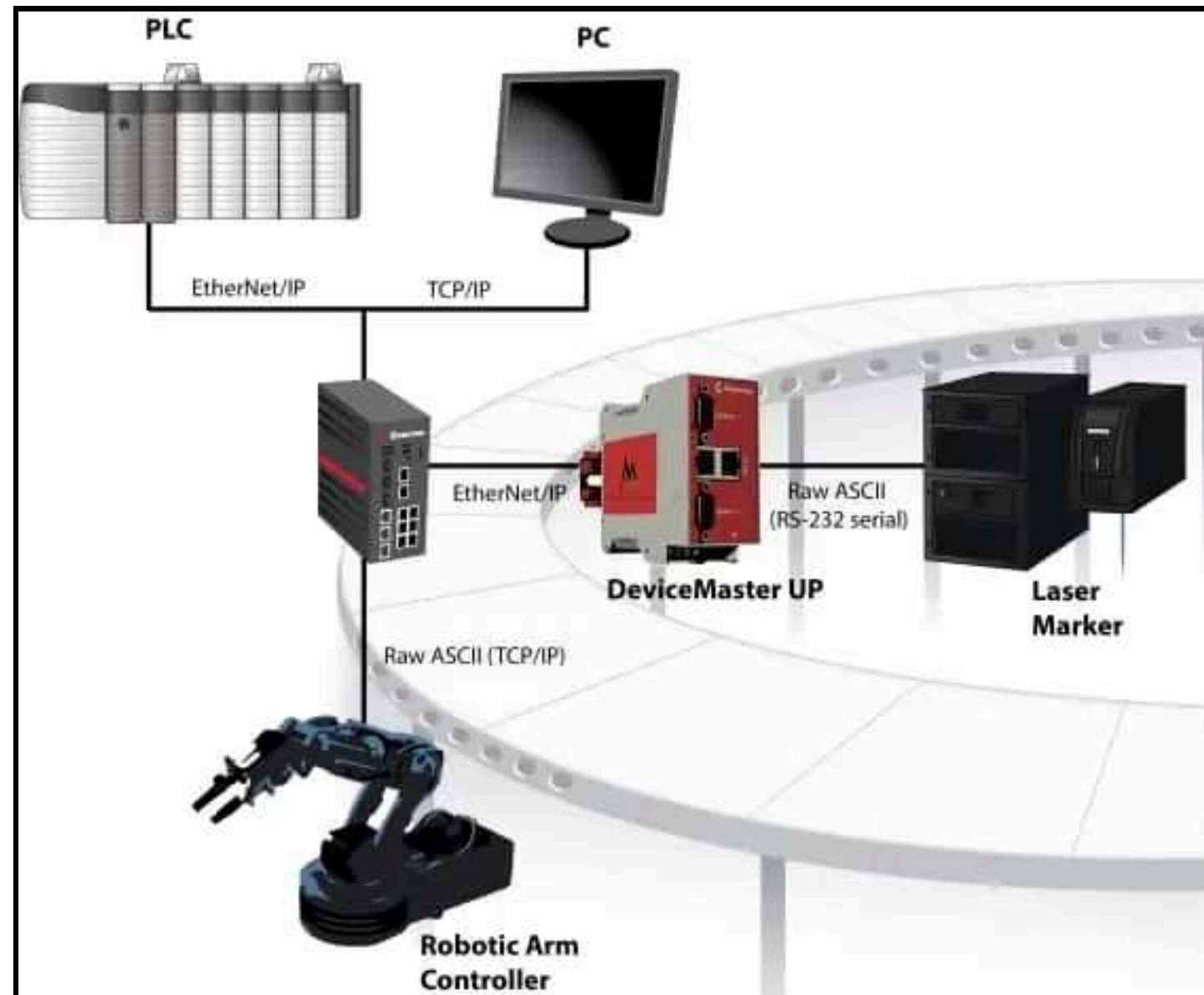


BASICS OF AUTOMATION





INDUSTRIAL AUTOMATION





INDUSTRIAL AUTOMATION



Industrial Automation is the use of control systems (such as computers, PLCs, and robots) and information technologies to handle industrial processes and machinery with minimal human intervention.

Levels of Industrial Automation

1. Field Level – Sensors and actuators.
2. Control Level – PLCs, DCS.
3. Supervisory Level – SCADA, HMIs.
4. Enterprise Level – ERP systems (for planning and analytics).

Key Objectives

- Increase productivity and efficiency.
- Improve quality control.
- Enhance safety.
- Reduce labor costs and human error.

Main Components of Industrial Automation

1. Sensors and Transducers
2. Detect physical parameters (temperature, pressure, position).
3. Actuators
4. Devices that perform actions (e.g., motors, solenoids).
5. Controllers
 - PLCs (Programmable Logic Controllers) – Industrial computers for real-time control.
 - DCS (Distributed Control Systems) – For large, complex processes like chemical plants.
6. HMIs (Human-Machine Interfaces)
7. Touchscreens or software that allow operators to interact with machines.
8. SCADA Systems
9. For centralized monitoring and control of industrial processes across multiple locations.
10. Industrial Networks
 - Communication protocols like Modbus, PROFIBUS, Ethernet/IP.

Advantages

- 24/7 operation
- Consistent output quality
- Reduced waste and energy use
- Fast response to production changes

Challenges

- High setup cost
- System complexity
- Need for skilled maintenance
- Cybersecurity vulnerabilities



Thank You