PLC Engineer Roadmap – From Beginner to Pro

This roadmap provides a structured learning path to grow from basic electrical knowledge to professional-level PLC, HMI, and industrial automation skills.

1. Stage 1 – Basics (Foundation)

- Basic electrical concepts: voltage, current, resistance, AC/DC
- Reading electrical schematics and wiring diagrams
- Sensors and actuators: inductive, capacitive, photoelectric, relays
- Industrial safety basics (lockout/tagout, grounding, protections)
- Introduction to automation systems and control panels

2. PLC Programming

- PLC hardware architecture (CPU, I/O modules, power supply)
- Programming languages: Ladder Diagram (LD), Structured Text (ST), Function Block Diagram (FBD)
- Digital and analog I/O handling
- Timers, counters, comparators, basic logic
- Debugging, online monitoring, and basic fault finding

3. HMI / SCADA Integration

- HMI fundamentals and screen navigation design
- Connecting HMI to PLC (tags, variables, addressing)
- Alarms, trends, and data visualization
- User management and basic security
- Introduction to SCADA systems and data logging

4. Industrial Communication

- Fieldbus basics: Modbus RTU/TCP
- Industrial Ethernet: Profinet, EtherNet/IP
- Network topology and addressing
- PLC-to-PLC communication
- Basic troubleshooting of communication errors

5. Advanced Topics

- Motion control basics (drives, inverters, servos)
- PID control and process automation

- Structured and modular programming
- Error handling, diagnostics, and system optimization
- Cybersecurity basics in industrial networks

6. Real Project Clarification

- Analyzing customer requirements and specifications
- Designing I/O lists and control architecture
- Developing and testing the PLC program
- HMI/SCADA implementation and validation
- Commissioning, documentation, and maintenance support