INTRODUCTION TO Programmable Logic Controller

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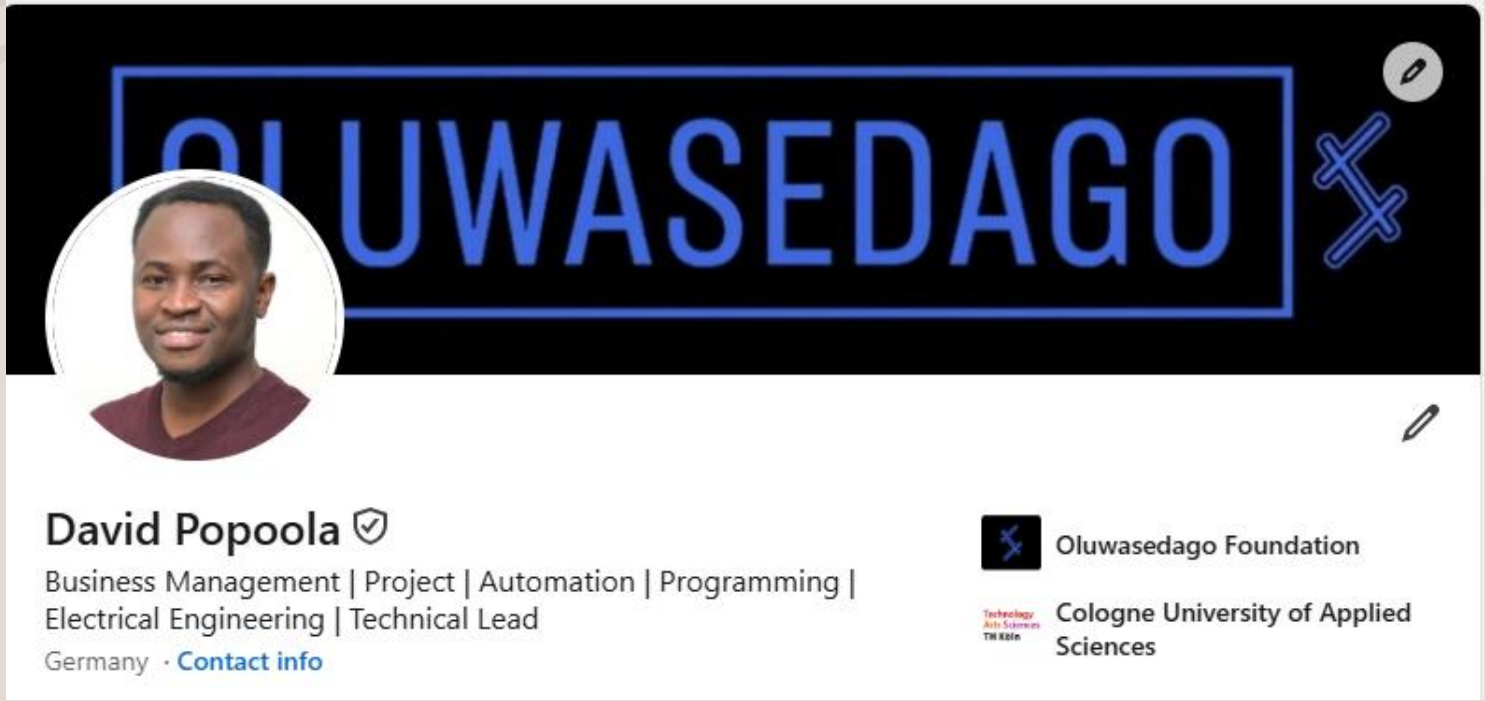
Introduction



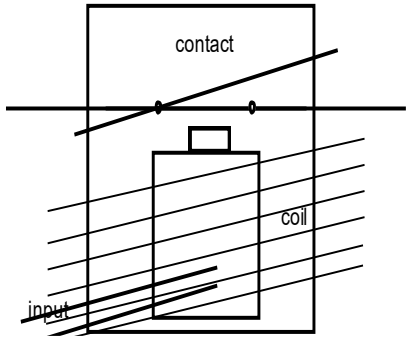
- Food and Beverage
- Automobile
- Energy
- Building Engineering

Programmable Logic Controller

Programmable Logic Controllers (PLCs) are industrial computers, with various inputs and outputs, used to control and monitor industrial equipment based on custom programming. — Inductive Automation

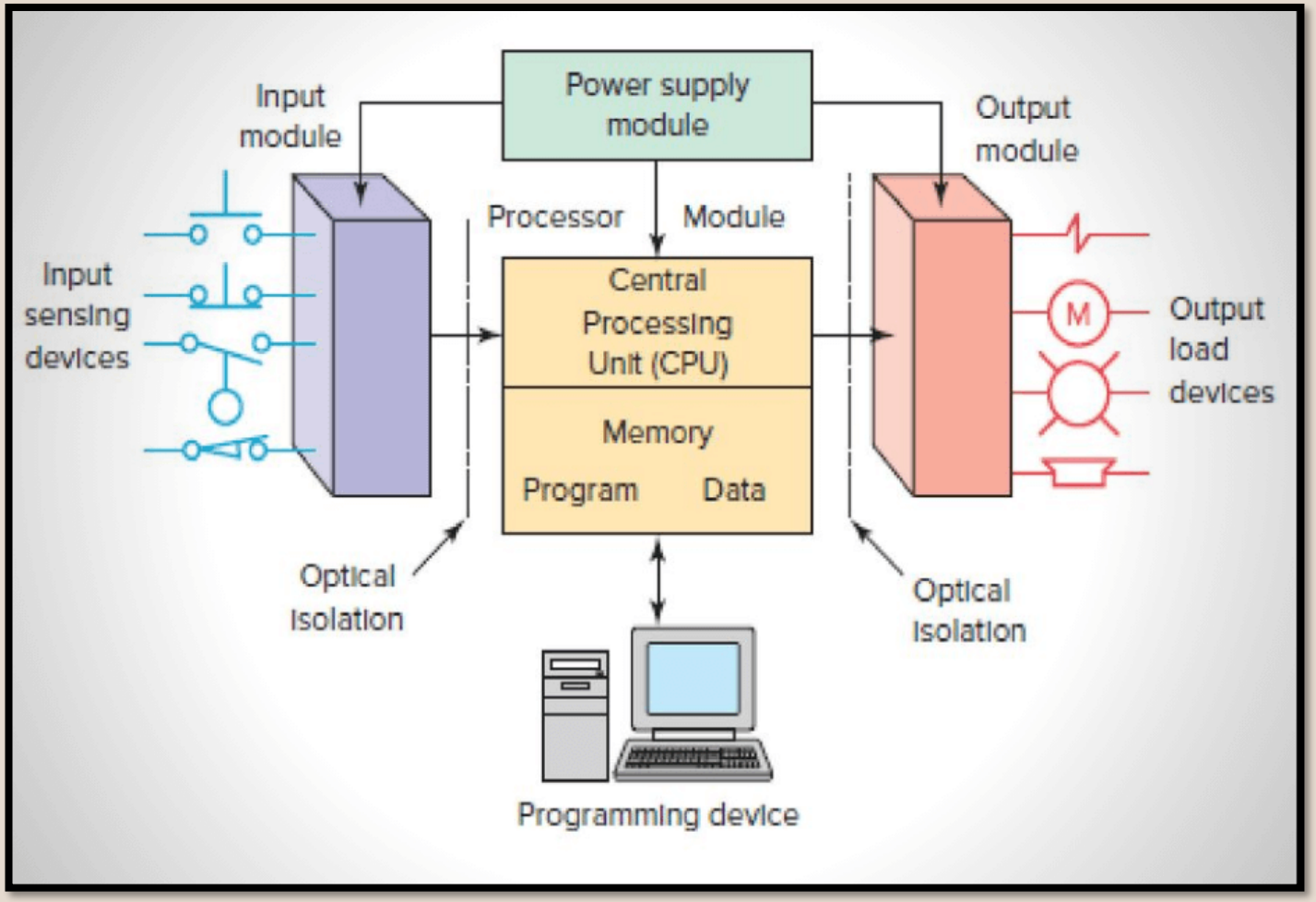
PLC History - Relay Logic

The first Modicon PLC was built in 1968 by General Motors Engineers.



PLC Development factors:
i. Easy to program.
ii. Change in program requiring no rewiring of the control system.
iii. Smaller in size, cheaper and high reliability.
iv. Simple construction and low maintenance
v. Cost- competitive

PLC - Architecture



PLC - Functions

CONTROL TYPE:	FUNCTIONS
Sequence Control	i. Conventional Relay Control Logic replacer ii. Timers/ Counter iii Printed Circuit Board Card controller replacer iv Auto/Semi-auto/Manual control of machine and process.
Advanced/ Sophisticated Control	i Arithmetic operation (+, -, × , ÷) ii. Information Handling iii Analog Control (Temperature, Pressure) iv P.I.D (Proportional Integral Derivation) v. Motor Control
Supervisory Control	i. Process monitoring and alarm. ii. Fault Diagnostic and monitoring iii Interfacing with Computer (RS-232C/RS 422) iv Factory Automation Networking v. Networking vi Factory Automation (F.A), Flexible Manufacturing System (F.M.S) & Computer Integrated Manufacturing (C.I.M).

PLC – Construction Types

COMPACT PLCs

With integrated input
and Output modules.

PLC – Construction Types

MODULAR PLCs

Expandable with modules:
Input, Output or
Communication Modules

PLC – Components

Processor	Arithmetic operations, logic operators, block memory moves, computer interface, local Area network, functions, etc
Memory	Measured in words. ROM (Read Only Memory), RAM (Random Access Memory), PROM, EPROM, EAPROM
I/O	AC voltage input and output, DC voltage input and output, Analog input and Output, Special purpose modules, e.g.., high speed timers, Stepping motor controllers, etc. PID, Motion
Power Supply	AC or DC Power supply
Peripherals	Network Communication Interface, HMI, Simulators, Printers etc

PLC – Top Manufacturers

SIEMENS

TIA-Portal

ABB

Automation Builder

Schneider

Schneider Electric Machine Expert

OMRON

Cx-One Automation

Allen-Bradley

Studio 5000 Logix Designer

HITACHI

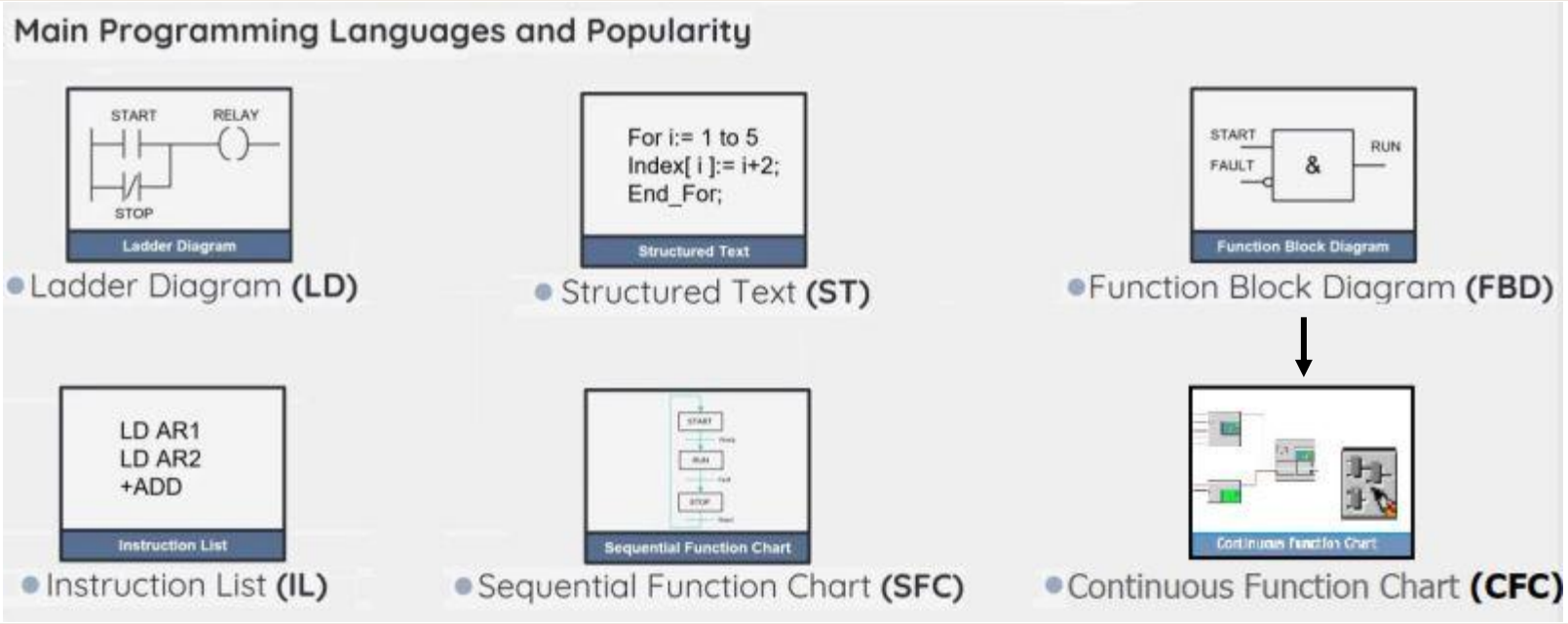
HX-Codesys

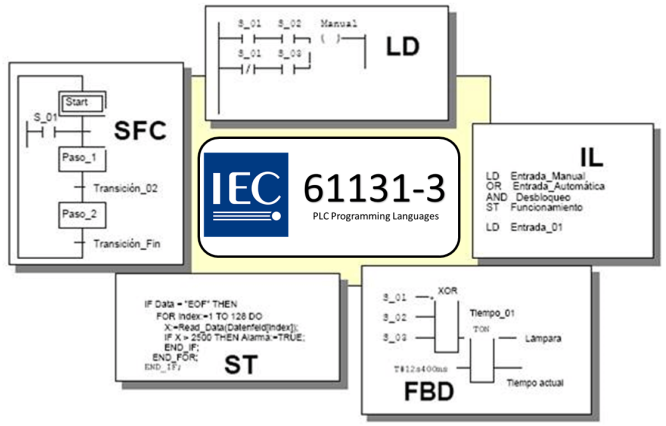
BECKHOFF

TwinCAT

PLC – Standardization

IEC61131-3: An international standard that defines the programming languages for Programmable Logic Controllers (PLCs). Its purpose is to standardize PLC software to improve interoperability, portability, and consistency across different hardware vendors. The standard specifies five main programming languages: Ladder Diagram (LD), Sequential Function Chart (SFC), Function Block Diagram (FBD), Structured Text (ST), and Instruction List (IL)





Resources

1. Beckhoff Information System – Link
2. Overview of IEC 61131 Standard – Link
3. Siemens Standards Compliance according to IEC 61131-3 – Link
4. Siemens IEC 61131-3 and SIMATIC S7 - Link

OLUWASEDAGO FOUNDATION

thank you

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