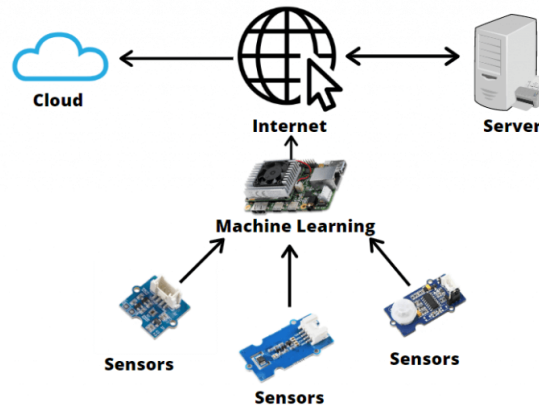


Edge AI

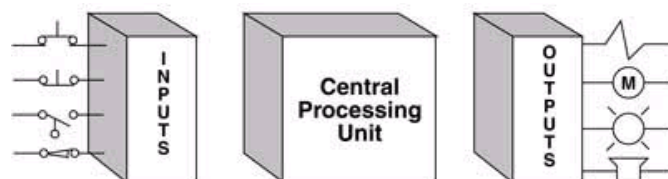
- It means running AI algorithms locally on a hardware device using edge computing where the AI algorithms are based on the data that are created on the device without requiring any connection.



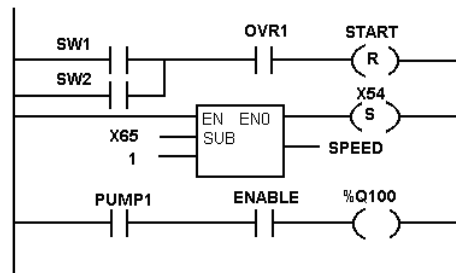
- The edge AI where machine learning algorithms are being run locally on a hardware device or embedded systems before sending it off to a remote location for further analysis.
- Advantages
 - Reduced costs
 - Security
 - Highly responsive
 - Easy to manage
- Applications
 - Surveillance and monitoring
 - Autonomous vehicles
 - Smart speakers
 - Industrial IoT
- Examples
 - NVIDIA® Jetson Nano™ Developer Kit
 - Sipeed Maixduino Kit for RISC-V AI + IoT
 - Raspberry Pi
 - Coral Dev Board

Programmable Logic Controller (PLC)

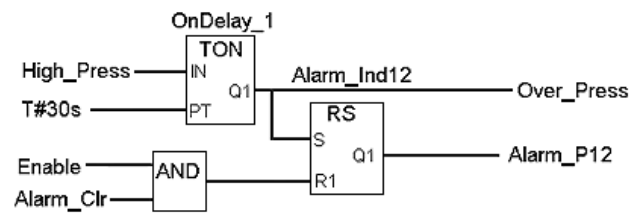
- An industrial computer control system that continuously monitors the condition of input devices and controls the state of output devices using a custom application.



- Programming languages used
 - Ladder diagram (LD)



- Function block diagram (FBD)



- Structured text (ST)

```

If Speed1 > 100.0 then
  Flow_Rate:= 50.0 + Offset_A1;
Else
  Flow_Rate:= 100.0; Steam:= ON
End_If;

```

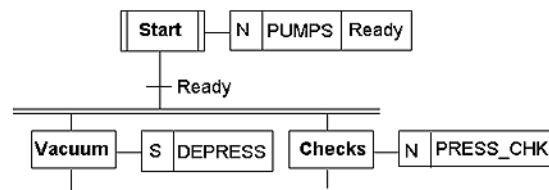
- Instruction list (IL)

```

LD R1
MPC RESET
LD PRESS_1
ST MAX_PRESS
RESET: LD 0
ST A_X43

```

- Sequential function chart (SFC)



- I/O devices

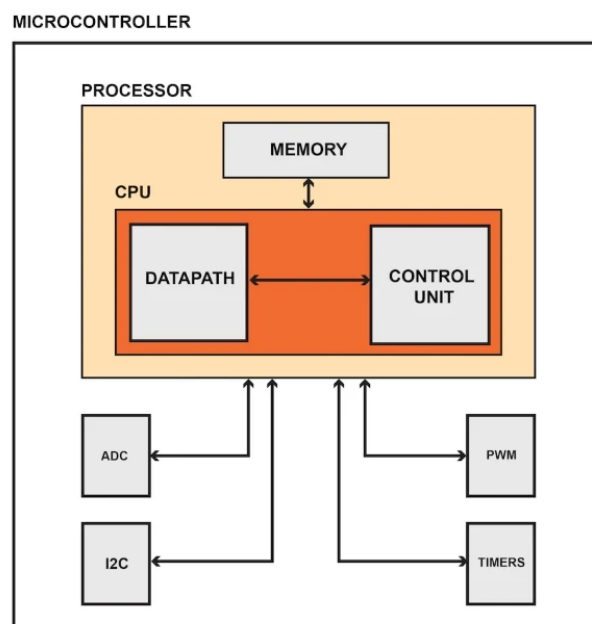


- Examples

- Allen-Bradley PLC
- GE Fanuc Automation
- Schneider Electric

Microcontroller

- An integrated circuit (IC) device used for controlling other portions of an electronic system, usually via a microprocessor unit (MPU), memory, and some peripherals.



- Elements of a microcontroller
 - Central processing unit (CPU)
 - Memory (volatile and non-volatile)
 - Peripherals
 - Data converters
 - Analog-to-digital (ADC)
 - Digital-to-analog (DAC)
 - Reference-voltage generator
 - Clock generation
 - Internal oscillator
 - Crystal-drive circuitry
 - Phase-locked loop
 - Timing
 - General-purpose timer
 - Real-time clock
 - External-event counter
 - Pulse-width modulation (PWM)
 - Analog signal processing
 - Operational amplifier
 - Analog comparator
 - Input/output
 - Serial communication
 - UART
 - SPI
 - i2C
 - USB
 - Support circuitry
 - Debug circuitry
 - Interrupts
- Advantages
 - Low time required for performing operation
 - Processor chip is small, and adaptability occurs
 - Cost and size of the system is less
 - Straightforward to interface with additional RAM, ROM, and I/O
- Disadvantages
 - Cannot interface a better power device directly
 - Number of executions is limited
 - Has limited processing speed and cannot be used for complex multitasking
- Examples
 - ATtiny and ATmega328p used in Arduino UNO by Microchip Technology Inc
 - Intel MCS-296
 - MSP430 by Texas Instruments