

Video-01

Arduino Opta \rightarrow PLC

[Programmable Logic Controller]

Inputs (2 types)

Digital: 0-24V

Analog: 0-10V

Outputs (4 types)

250V AC

10A

We can load any kind of DC or AC load to ~~the output~~ this and it will do its job fine

Microcontroller: \rightarrow 3.3-5V

$\downarrow \uparrow$

6V-24V+

(1) Flexible: We can build exactly what we

(2) Time \uparrow

(3) Complex \uparrow

Capacitive Sensor \rightarrow Detects any kind of object

Inductive " \rightarrow " only metal object

PLC

Microcontroller

(I) Easy to Code

(II) Simple Writing

(III) Quick Changes

(IV) Standard inputs/
outputs

(V) 'Simple' Tanks
automation

(I) Harder to Code

(II) More features

(III) More Complicated writing

(IV) 'Complex' Tanks

(own device)

Audio Amplifier

Increases the audio volume.

Transistor \rightarrow current \uparrow

$V \downarrow$

Volume \uparrow

Diode \rightarrow Two terminal electronic compound that flows the current in one direction.

Heat Sinks \rightarrow Sinks the extra heat

Capacitor \rightarrow Stores electrical energy

Transistor \rightarrow BJT: Three terminal semiconductor

Bipolar Junction

Transistor

device that amplifies or switches electronic signals by controlling the flow of current between

two terminals (collector and emitter) with a small current at the third terminal (base).

MOSFET Transistor: Switching and Amplifying signals in electronic devices

(Metal Oxide Semiconductor Field Effect Transistor)

Inductor/Coil: Stores energy in a magnetic field

Bridge Rectifier:

Diode's silver band indicates it's cathode side

Converts AC to DC

Voltage Regulator:

Maintains a constant output voltage (The input voltage may vary)

DC Converter:

Converts DC voltage levels up or down for efficient power management.

Two Position controller:

~~It can take the~~ The magnitude of the output signal which can take only two values established completely on / completely off.

PID controller: Adjusts the output continuously with (Proportional, Integral and Derivative)

Temperature Sensor:

Hall Effect Sensor: Detects magnetic field

Position sensing

Speed detection

Strain Gauges / Load Cell: Measures force or

weight by detecting deformation

in materials.

LED: Light

7 Segment Display: Displays numerical digits

DC Motor: Electrical energy \rightarrow Rotational Motion

Brushless DC Motor:

Efficiency $\uparrow\uparrow$ than brushed motors.

Used in drones and electric vehicles.

Stepper Motor: Allows precise control of angular position

Servo Motor: " " " " " " and acceleration, velocity

555 Timer IC:

Generates precise time delays or oscillations

Operational Amplifiers:

Amplify voltage signals,

Digital Potentiometer:

Electronically adjustable resistor

Used for tuning and calibration in circuits

Digital to Analog Converter:

Digital signals \rightarrow Analog voltage or current.

Analog to Digital Converter:

Analog signal \rightarrow Digital Data

Schmitt Trigger:

Noisy / Analog signal \rightarrow Clean digital signal

IGBT \rightarrow For high power application

Oscilloscope \rightarrow Visualizes voltage waveforms over time.

Analysis of signal integrity, frequency and phase

Thyristors \rightarrow Controls higher power AC signal

Optocouplers \rightarrow Provides electrical isolation between different parts of a circuit.

Timers \rightarrow Used in microcontrollers for timing operations

I²C and SPI: Enables communication between microcontrollers and peripheral devices