

Distributed Intelligence Systems

What Are Distributed Microcontroller Systems?
Features!
Communication Methods!
Applications !
Some PIC-types and suitabilities

What Are Distributed Microcontroller Systems?

A **distributed microcontroller system** consists of multiple microcontrollers (MCUs) that are networked together to perform coordinated tasks. Instead of a single, central controller, intelligence and control are spread across several nodes, each with its own microcontroller. These nodes communicate and collaborate to achieve system-wide goals.

Features of DIS.

Decentralization: No single point of failure; each node can operate independently or semi-independently.

Scalability: Easy to add or remove nodes as needed.

Fault Tolerance: If one node fails, others can continue functioning.

Real-Time Operation: Often used in systems requiring real-time responses.

Improved Efficiency

Communication Methods!

- **I2C and SPI:** For short-distance, high-speed communication.
- **CAN Bus (Controller Area Network):** Widely used in automotive and industrial systems.
- **RS-485/RS-232:** For industrial and legacy systems.
- **Ethernet/Wi-Fi:** For more complex or long-distance networking.

Applications

- **Automotive:** Modern vehicles use dozens of microcontrollers communicating over CAN or LIN buses for engine control, safety, infotainment, etc.
- **Industrial Automation:** Distributed control of sensors, actuators, and machines.
- **Smart Homes/IoT:** Devices like thermostats, lights, and security systems coordinate via distributed MCUs.
- **Robotics:** Multiple microcontrollers manage different subsystems (motors, sensors, communication).

Some PIC-types and suitabilities

*PIC 16F84A < PIC 16F873A < PIC 16F883 < PIC 18 Series

—PIC 16F873A and PIC 16F883 kept the core and enhanced the peripherals .

—PIC 18 Series devices advanced the core, while keeping the peripherals reasonably constant.

Thus as the systems become more advanced the PIC series types to deployed changes.

The PIC 16 series types retained a core which was designed with modest applications in mind.