Al-Mustaqbal University

College of Engineering and Technology

Department of Medical Instrumentation Techniques Engineering

Class: Third Class

Subject: Microprocessor interfacing .

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Microprocessor interfacing .

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Introduction to Microprocessor Interfacing

- **Definition:** The process of interconnecting a microprocessor with external devices (memory, I/O devices, or peripherals).
- **Objective:** To achieve seamless integration between the microprocessor and other devices to expand system functionality.
- **Simple Example:** Connecting a microprocessor with a display screen to show computed data.

Importance of Microprocessor Interfacing

- **Enhancing Processor Capabilities:** By interfacing with memory or I/O devices.
- **Expanding Applications:** Such as medical systems, smart devices, and industrial control systems.
- **Interacting with the External World:** Collecting data or controlling the environment

Types of Microprocessor Interfacing

A. Memory Interfacing

- Connecting the microprocessor to external memory (RAM or ROM).
- **Key Elements:**
  - **Address Bus:** Specifies the data location.
  - **Data Bus:** Transfers data.
  - **Control Bus:** Manages read/write signals

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B. I/O Interfacing

- Connecting with input/output devices.
- **Types:**
  - **Mapped I/O:** Shares address lines with memory.
  - **Isolated I/O:** Uses separate lines.

C. Interrupt Interfacing

- Managing interrupts to handle sudden events.
- **Types:**
  - **Hardware Interrupts:** Signals from external devices.
  - **Software Interrupts:** Signals triggered by code instructions
  -

4. Core Components of Interfacing

- **Decoder:** To analyze address lines and select the correct device.
- **Buffer:** To improve data transfer and reduce interference.
- **Latch:** Temporarily stores data during transfer.
- **Peripheral Controller:** Regulates communication with peripheral devices.

5. Challenges and Solutions in Interfacing

- **Signal Synchronization:** Differences in speeds between the processor and devices.
  - **Solution:** Use timing circuits or buffers.
- **Hardware Limitations:** Limited number of address lines.
  - **Solution:** Use multiplexing techniques.
- **Interrupt Management:** Handling multiple interrupts efficiently.
  - **Solution:** Use an interrupt controller.

6. Practical Applications

- **Medical Systems:** Connecting sensors for vital signal analysis.
- **Smart Devices:** Controlling lighting or temperature.
- **Robotics:** Controlling motors and sensors using a microprocessor.

7. Practical Example

Connecting an 8086 Microprocessor to a 4KB ROM

1. **Determine Address Lines:** 12 lines (A0 – A11) to cover 4KB.
2. **Connect Data Lines:** 8 lines (D0 – D7) for data transfer.
3. **Use Chip Select (CS) Signal:** To activate the memory when needed.
4. **Signals:**
    - **RD (Read):** To read data from memory.
    - **WR (Write):** To write data (in the case of RAM)

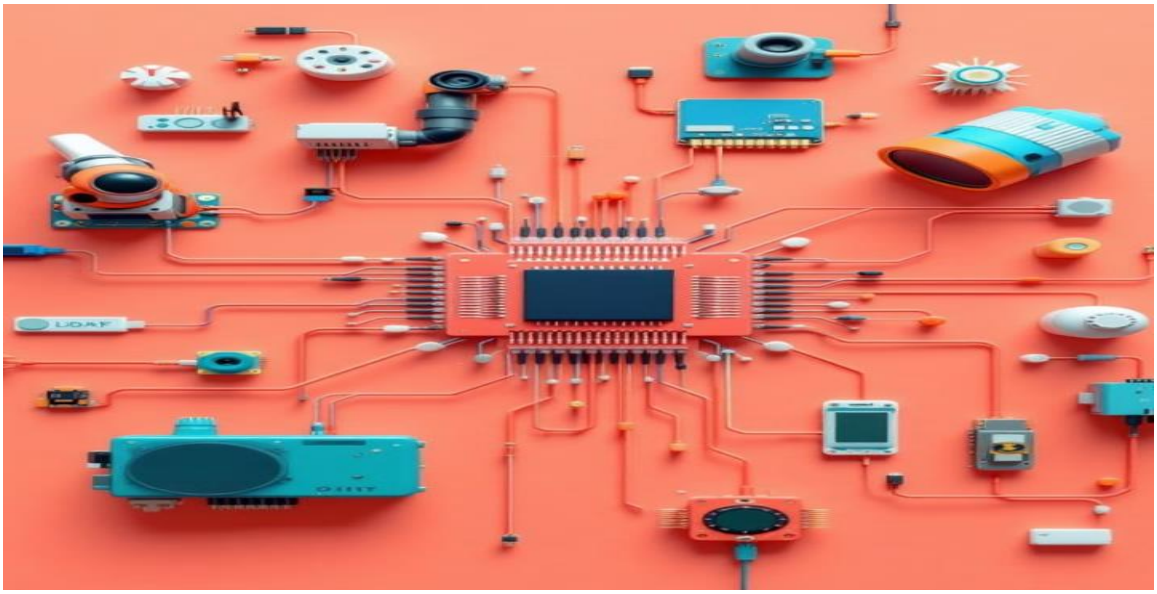

Fig1 Microprocessor