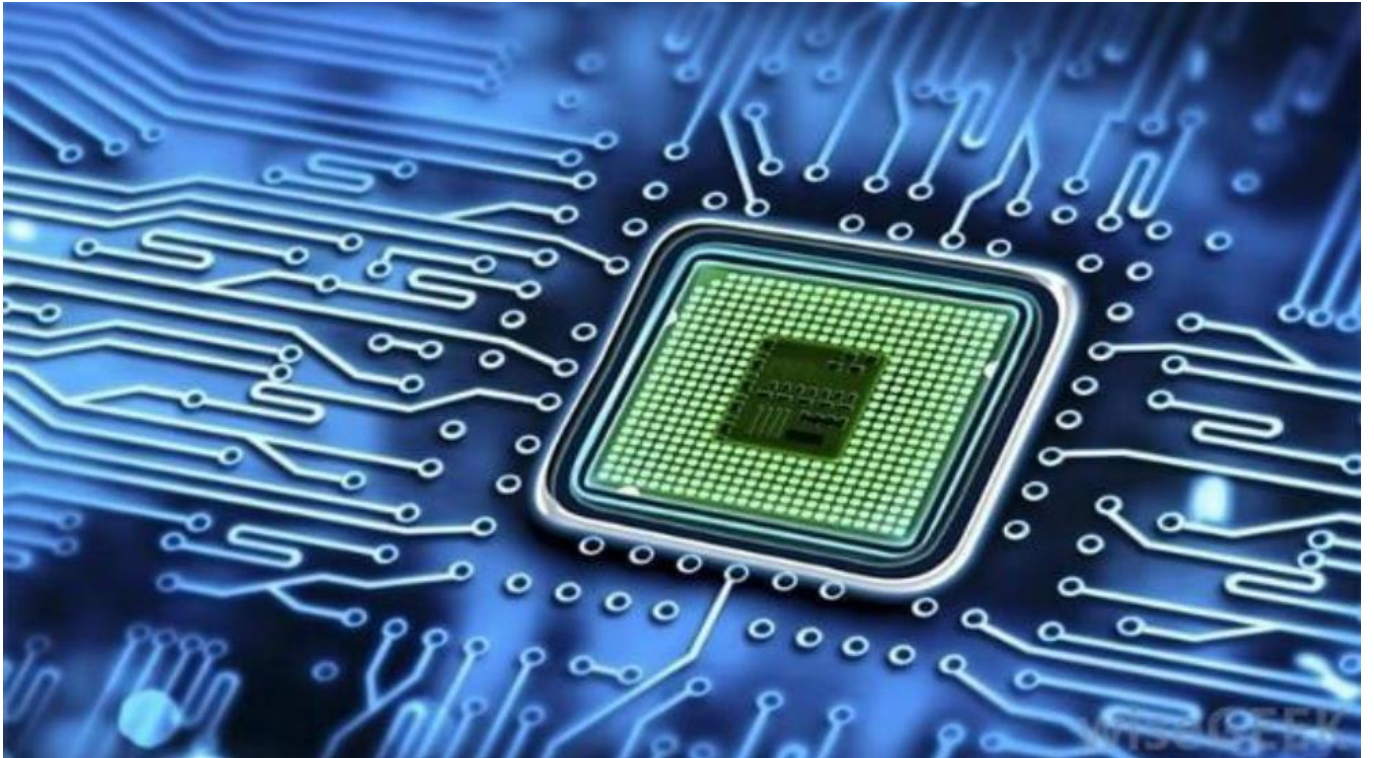جامعة الفرات الاوسط التقنية

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الكلية التقنية الهندسية /نجف
هندسة تقنيات الليزر والالكترونيات البصرية

مختبر معالج دقيق

Exp. No: 1

Exp. Name: Introduction to Microprocessor

Introduction :

Microcomputer: The term microcomputer is generally synonymous with personal computer, or a computer that depends on a microprocessor. Microcomputers are designed to be used by individuals, whether in the form of PCs, workstations or notebook computers.A microcomputer contains a CPU on a microchip (the microprocessor), a memory system (typically ROM and RAM), a bus system and I/O ports, typically housed in a motherboard.

 Microprocessor: A silicon chip that contains a CPU. In the world of personal computers, the terms microprocessor and CPU are used interchangeably. A microprocessor (sometimes abbreviated µP) is a digital electronic component with miniaturized transistors on a single semiconductor integrated circuit (IC).One or more microprocessors typically serve as a central processing unit (CPU) in a computer system or handheld device. Microprocessors made possible the advent of the microcomputer. At the heart of all personal computers and most working stations sits a microprocessor. Microprocessors also control the logic of almost all digital devices, from clock radios to fuel-injection systems for automobiles. Three basic characteristics differentiate microprocessors: Instruction set: The set of instructions that the microprocessor can execute.Bandwidth: The number of bits processed in a single instruction.

Clock speed: Given in megahertz (MHz), the clock speed determines how many instructions per second the processor can execute. In both cases, the higher the value, the more powerful the CPU. For example, a 32-bit microprocessor that runs at 50MHz is more powerful than a 16-bit microprocessor that runs at 25MHz.

In addition to bandwidth and clock speed, microprocessors are classified as being either RISC (reduced instruction set computer) or CISC (complex instruction set computer)

8085 Microprocessor :

The Intel 8085 is an 8-bit microprocessor introduced by Intel in 1977. It was binary compatible with the more-famous Intel 8080 but required less supporting hardware, thus allowing simpler and less expensive microcomputer systems to be built. The "5" in the model number came from the fact that the 8085 requires only a +5-Volt (V) power supply rather than the +5 V, −5 V and +12 V supplies the 8080 needed. The main features of 8085 µP are:

• It is an 8-bit microprocessor.

 • It is manufactured with N-MOS technology.

 • It has 16-bit address bus and hence can address up to 216= 65536 bytes (64KB) memory locations through A0–A15.

 • The first 8 lines of address bus and 8 lines of data bus are multiplexed AD0–AD7

• Data bus is a group of 8 lines D0–D7.

- It supports external interrupt request.

- A 16-bit program counter (PC)

- A 16-bit stack pointer (SP)

- Six 8-bit general purpose register arranged in pairs: BC, DE, HL.

- It requires a signal +5V power supply and operates at 3.2 MHZ single phase clock.

- It is enclosed with 40 pins DIP (Dual in line package).

8085 Architecture 8085

The various units of a microprocessor are listed below

- Accumulator

- Arithmetic and logic Unit

- General purpose register

- Program counter

- Stack pointer

- Temporary register

- Flags

- Instruction register and Decoder

- Timing and Control unit

- Interrupt control

- Address buffer and Address-Data buffer

- Address bus and Data bus

Address bus and Data bus :

We know that 8085 is an 8-bit microprocessor. So, the data bus present in the microprocessor is also 8-bits wide. So, 8-bits of data can be transmitted from or to the microprocessor. But 8085 processor requires 16-bit address bus as the memory addresses are 16-bit wide. The 8 most significant bits of the address are transmitted with the help of address bus and the 8 least significant bits are transmitted with the help of multiplexed address/data bus. The eightbit data bus is multiplexed with the eight least significant bits of address bus. The address/data bus is time multiplexed. This means for few microseconds, the 8 least significant bits of address are generated, while for next few seconds the same pin

generates the data. This is called Time multiplexing. But there are situations where there is a need to transmit both data and address simultaneously. For this purpose, a signal called ALE (address latch enables) is used. ALE signal holds the obtained address in its latch for a long time until the data is obtained and so when the microprocessor sends the data next time the address is also available at the output latch. This technique is called Address/Data demultiplexingAddress bus and Data bus We know that 8085 is an 8-bit microprocessor. So, the data bus present in the microprocessor is also 8-bits wide. So, 8-bits of data can be transmitted from or to the microprocessor. But 8085 processor requires 16-bit address bus as the memory addresses are 16-bit wide. The 8 most significant bits of the address are transmitted with the help of address bus and the 8 least significant bits are transmitted with the help of multiplexed address/data bus. The eightbit data bus is multiplexed with the eight least significant bits of address bus. The address/data bus is time multiplexed. This means for few microseconds, the 8 least significant bits of address are generated, while for next few seconds the same pin generates the data. This is called Time multiplexing. But there are situations where there is a need to transmit both data and address simultaneously. For this purpose, a signal called ALE (address latch enables) is used. ALE signal holds the obtained address in its latch for a long time until the data is obtained and so when the microprocessor sends the data next time the address is also available at the output latch. This technique is called Address/Data demultiplexing.