

The background of the cover features a person with glasses and a blue sweater working on a circuit board. The scene is overlaid with a blue digital aesthetic, including glowing circuit traces, a glowing microchip, and a grid pattern. The overall color scheme is dominated by various shades of blue.

Introduction to

MICROPROCESSOR SYSTEMS

JACK LI

Introduction to Microprocessor and Microcomputer.

Lecture-1

An Overview of Microprocessor:

Microprocessor is a controlling unit of a microcomputer, fabricated on a small chip that contains millions of transistors connected by wires capable of performing Arithmetic Logical Unit (ALU) operations and communicating with the other devices connected to it, a multipurpose, clock driven, register based, digital integrated circuit which accepted binary data as input, processes it according to instructions stored in its memory, and provides results as output as shown in fig 1.



fig 1 :shape of a microprocessor

Typical microprocessor operations include adding, subtracting, comparing two numbers, and fetching numbers from one area to another.

The microprocessor can be divided into three segments as shown in fig 2. ALU, register array, and control unit.

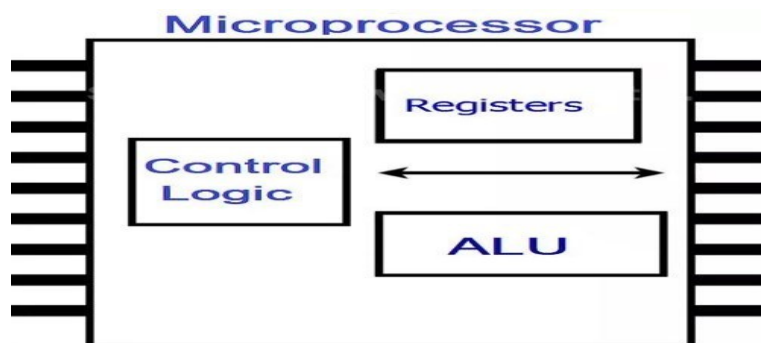


Fig 2: parts of a microprocessor

A microprocessor consists of an ALU An arithmetic logic unit, control unit and register array. Where ALU performs arithmetic and logical operations on the data received from an input device or memory. CU which performs the task of controlling functions of the computer Control unit controls the instructions and flow of data within the computer. And, register array consists of registers identified by letters like B, C, D, E, H, L, and accumulator, register arrays are used within the CPU to store data that is actively being processed by the processor.

A number of bits taken as a group in this manner is called word. For example, the first commercial microprocessor the Intel 4004 which was introduced in 1971 is a 4-bit machine and is said to process a 4-bit word. A 4-bit word is commonly known as nibble and an 8-bit word is commonly known as byte. Intel 8085A is an 8-bit microprocessor whereas Intel 8086 is a 16-bit microprocessor. Kilobyte is a collection of 1024 bytes is called a kilobyte (2^{10} bytes), megabyte is a collection of 1024 kilobyte is called a megabyte (2^{10} bytes).

Microcomputers:

microcomputer is best regarded as a system incorporating a CPU and associated hardware whose purpose is to manipulate data in some fashion. This is exactly what any digital circuit designed using SSI's and MSI's does. Therefore, a microcomputer is an assembly of devices including a CPU, which manipulate data depending on one or more inputs and according to a program, in order to generate one or more output.

MSI (Medium Scale Integration). An integrated circuit that contains between 30

and 1,000 electronic components on a single circuit or microchip is known as Medium-Scale Integration. SSI (Small-Scale Integration) is a chips generation created in 1964 with between 1 and 10 transistors and 1 and 12 logic gates. As the technology has advanced from SSI to VLSI & SLSI, LSI (Large Scale Integration) refers to Large Scale Integration with logic gates ≤ 1000 . the face of the computer has changed gradually and it became possible to build the entire central processing unit (CPU) on a single piece known as microprocessor. what is the difference between Microcontroller and Microprocessor A computer's Central Processing Unit (CPU) constructed on a single Integrated Circuit (IC) is a microprocessor, A computer with one microprocessor, which functions as a CPU ,has memory, a CPU and I/O. All these are integrated into one chip, is a microcomputer. The key difference between these two units is that microcontrollers combine all the necessary elements of a microcomputer system onto a single piece of hardware as shown in fig 3. Microcontrollers do not require additional peripherals or complex operating systems to function, while microprocessors do. A microprocessor follows a sequence: fetch, Decode, and then Execute. Initially, the instructions are stored in the memory in a sequential order.

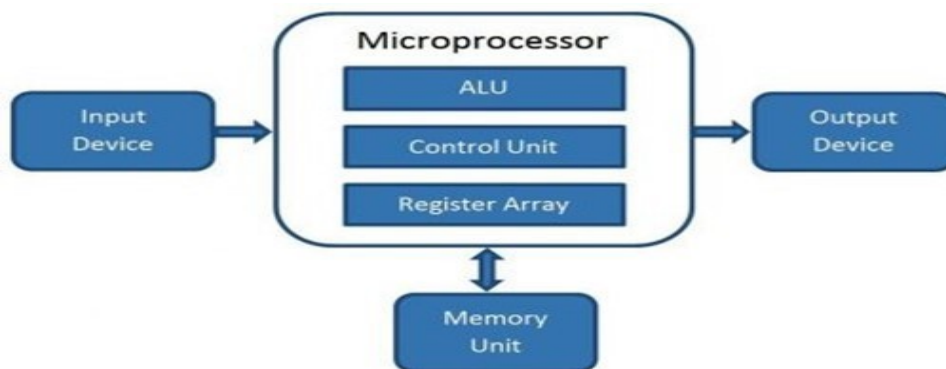



Fig 3: shape of a microcomputer

Evolution of the Microprocessors:

1. the first generation came which brought microprocessors like INTEL 4004 Rockwell international PPS-4 INTEL 8008 etc.
2. The second generation marked the development of 8-bit microprocessors from 1973 to 1978. Processors like INTEL 8085 Motorola 6800 and 6801 etc came into existence.
3. The third generation brought forward the 16-bit processors like INTEL 8086/80186/80286 Motorola 68000 68010 etc. From 1979 to 1980 this generation used the HMOS technology.
4. The fourth-generation came into existence from 1981 to 1995. The 32-bit processors using HMOS fabrication came into existence. INTEL 80386 and Motorola 68020 are some of the popular processors of this generation.
5. From 1995 till now we are in the fifth generation. 64-bit processors like PENTIUM, Celeron, dual, quad, and octa-core processors came into existence.

Table: Evaluation of major μ P characteristics from Intel

	4004	8008	8085A	8086	80386
Data Bus	4-bit	8-bit	8-bit	16-bit	32-bit
Address capacity	4K	16K	64K	1M	4G
Addition time	10.8 μ s	20 μ s	1.3 μ s	0.375 μ s	0.125 μ s
Transistors	2,300	2,000	6,200	29,000	275,000
Package size 	16pin	18pin	40pin	40pin	132pin
Chip size(mil)	117x159	125x170	164x222	225x230	390x390

Applications of Microprocessors:

The application of microprocessors is increasing day by day. Some of the applications are:

- 1) Standalone electronics cash system
- 2) Electronic games
- 3) Vending and dispensing machines
- 4) Market scales
- 5) Traffic light controls

6) Home heating and lighting controls

7) Security & fire alarm system

8) Home appliances

9) Desktop computers

10) Check processor

11) Medical instrumentation

12) Automobile diagnostics

13) Optical character recognition

14) I/O terminal for computers.