

Introduction to Microprocessor and Microcomputer

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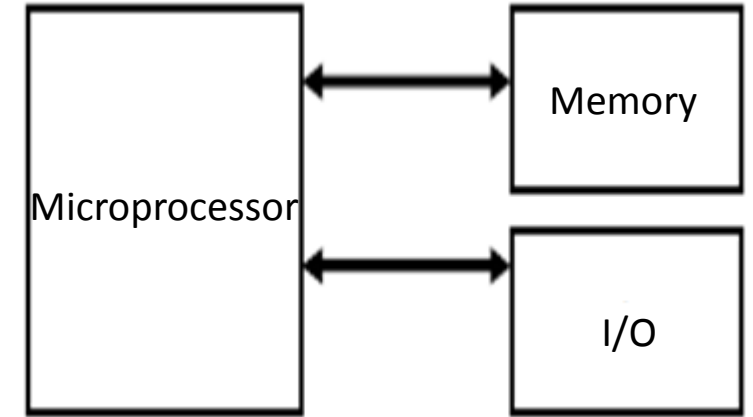
Microprocessor

A Microprocessor is a multipurpose, Programmable clock-driven, register based electronic device,

That read binary instruction from a storage device called memory, accepts binary data as input and processes data according to those instructions and provides results as outputs.

Microprocessor is clock driven semiconductor device which is manufactured by using LSI and VLSI technique.

Typically it consist of Three devices



These three devices work together and interact with each other.

In Reprogrammable system the microcomputer is used for computing and data processing

Microcomputer

A **microcomputer** is a small, relatively inexpensive computer with a microprocessor as its central processing unit (CPU). It includes a microprocessor, memory, and input/output (I/O) facilities.

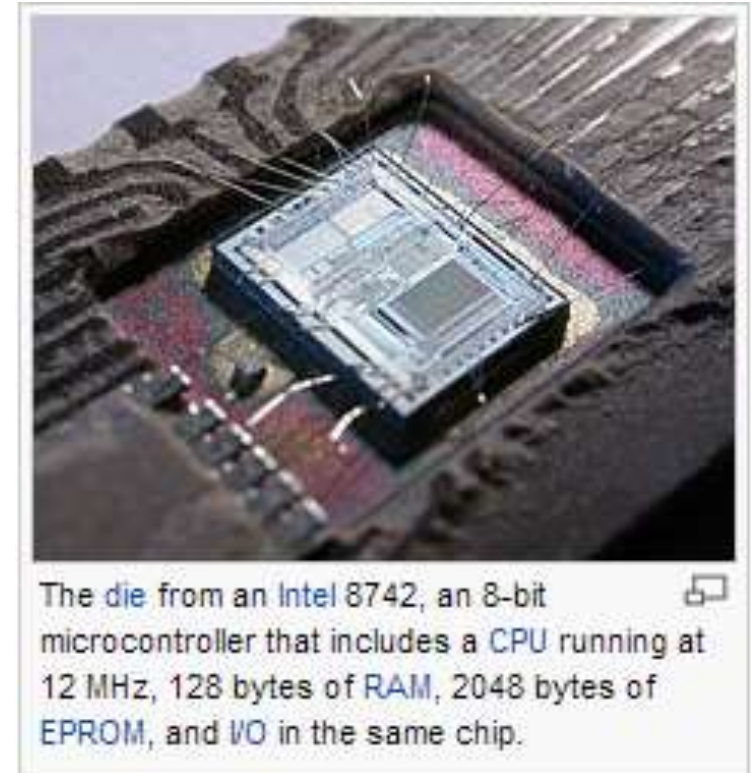
Microcomputers became popular in the 1970s and 80s with the advent of increasingly powerful microprocessors.

- Examples of Microcomputers are Intel 8051 controller-a single board computer,
- IBM PC and Apple Macintosh computer.

Micro Controller

- A **microcontroller** is a small computer on a single integrated circuit containing a processor core, memory, and programmable input/output peripherals
- Microcontrollers are used in automatically controlled products and devices, such as automobile engine control systems, implantable medical devices, remote controls, office machines, power tools, toys and other embedded systems.

Example:
Die (integrated Circuit)



General Architecture of Microcomputer System

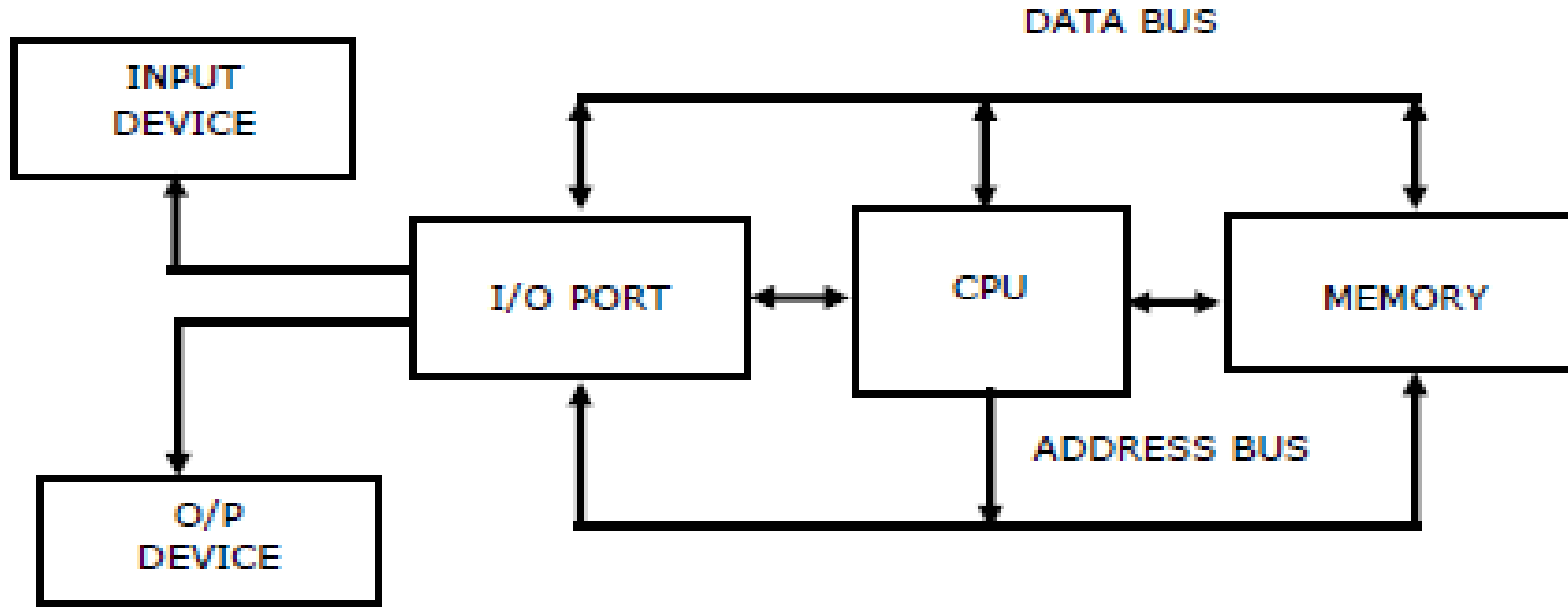


Figure: Block Diagram of a simple Microcomputer

The major parts are CPU, Memory and I/O

There are three buses, address bus, data bus and control bus;

Continue....

Memory

- Memory consist of RAM and ROM, the purpose of memory is to store binary codes for the sequences of instructions you want the computer to carry out.
- The second purpose of the memory is to store the binary-coded data with which the computer is going to be working.

Input / Output

- The input/output or I/O Section allows the computer to take in data from the out side world or send data to the outside world.
- Peripherals such as keyboards, video display terminals, printers are connected to I/O Port.

CPU(Central Processing Unit)

- In a microcomputer CPU is a microprocessor.
- The fetches binary coded instructions from memory, decodes the instructions into a series of simple actions and carries out these actions in a sequence of steps.
- The CPU also contains an address counter or instruction pointer register, which holds the address of the next instruction or data item to be fetched from memory.

Address Bus

- The address bus consists of 16, 20, 24 or 32 parallel signal lines.
- On these lines the CPU sends out the address of the memory location that is to be written to or read from. The no of memory location that the CPU can address is determined by the number of address lines.
- If the CPU has N address lines, then it can directly address 2^N memory locations i.e. CPU with 16 address lines can address 2^{16} or 65536 memory locations.

Data Bus

- The data bus consists of 8, 16 or 32 parallel signal lines.
- The data bus lines are bi-directional.
- This means that the CPU can read data in from memory or it can send data out to memory

Control Bus

- The control bus consists of 4 to 10 parallel signal lines.
- The CPU sends out signals on the control bus to enable the output of addressed memory devices or port devices.
- Typical control bus signals are Memory Read, Memory Write, I/O Read and I/O Write.

Components of CPU

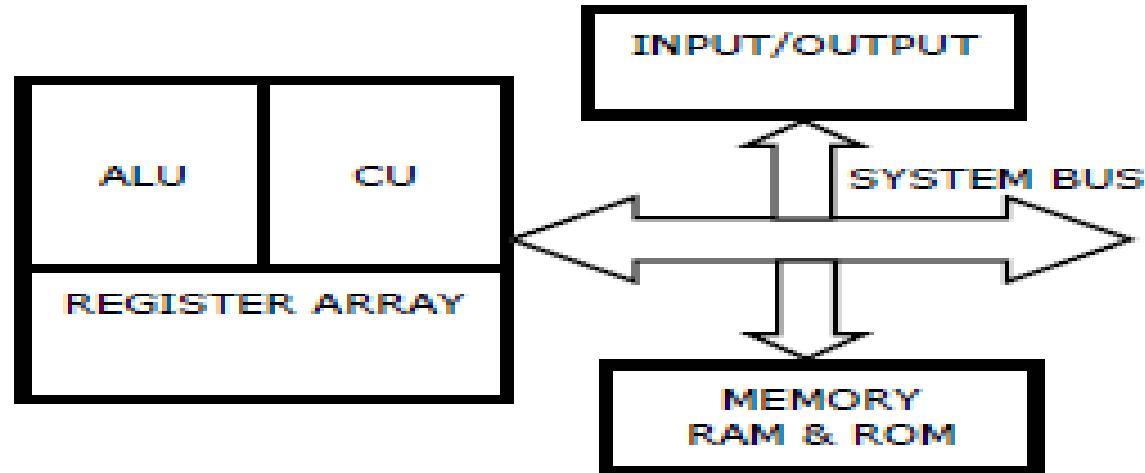


Figure: Microprocessor Based System with Bus Architecture.

Microprocessor is Divided into three segments-

1. ALU
2. Register Array
3. Control Unit

Arithmetic Logic Unit

- This is the area of Microprocessor where various computing functions are performed on data.
- The ALU performs operations such as addition, subtraction and logic operations such as AND, OR and exclusive OR.

Control Unit

- The Control Unit Provides the necessary timing and control signals to all the operations in the Microcomputer
- It controls the flow of data between the Microprocessor and Memory and Peripherals.
- The Control unit performs 2 basic tasks
 - Sequencing
 - Execution

Register Array

- These are storage devices to store data temporarily.
- There are different types of registers depending upon the Microprocessors.
- These registers are primarily used to store data temporarily during the execution of a program and are accessible to the user through the instructions.
- General purpose Registers of 8086 includes AL, AH, BL, BH, CL, CH, DL, DH

Thank you