Computer Architecture

Lecture 1
Introduction to Microprocessor

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Introduction

- A microprocessor is a very small electronic circuit typically inch (12mm) across.
- It is easily damaged by moisture or abrasion so to offer it some protection it is encapsulated in plastic or ceramic.
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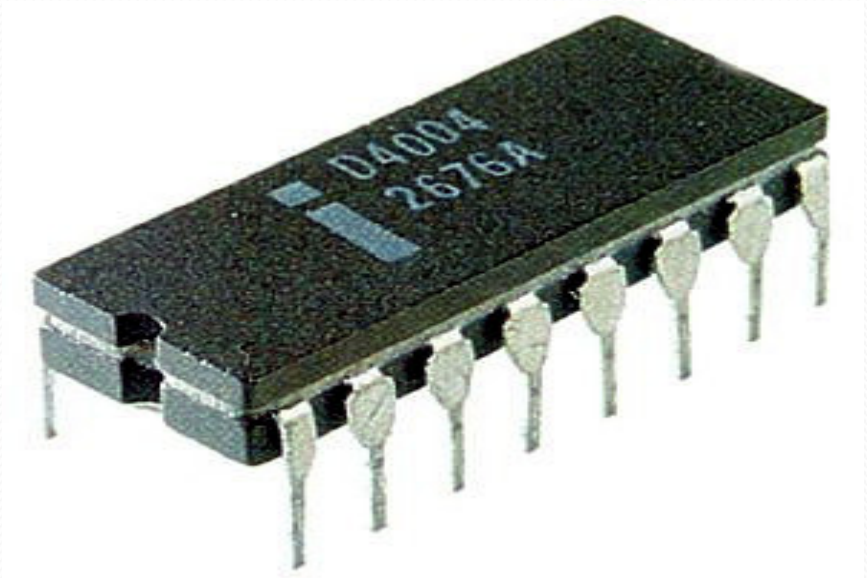
- To provide electrical connections directly to the circuit would be impractical owing to the size and consequent fragility, so connecting pins are moulded into the case and the microprocessor then plugs into a socket on the main circuit board.

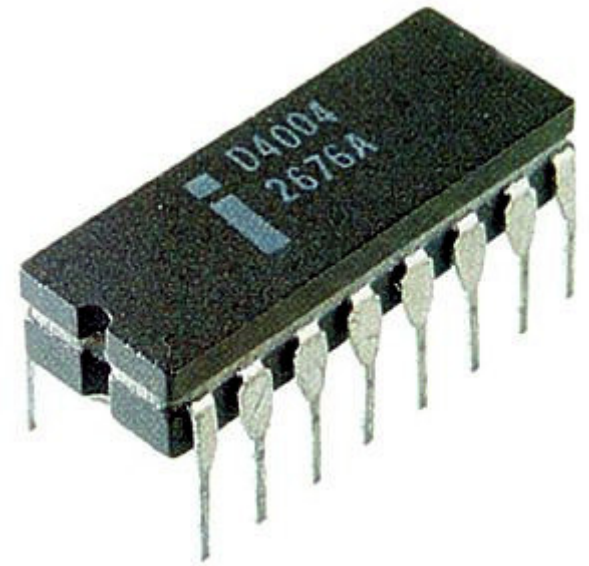
Introduction

- The size, shape and number of pins on the microprocessor depend on the amount of data that it is designed to handle. The trend, as in many fields, is forever upward. Typical microprocessor is shown in Figure below.



Introduction

- **Evolution Of Microprocessors**
  - The first microprocessor was introduced in the year 1971. It was introduced by Intel and was named Intel 4004.
  - Intel 4004 is a 4 bit microprocessor and it was not a powerful microprocessor. It can perform addition and subtraction operation on 4 bits at a time.



Introduction

- However it was Intel's 8080 was the first microprocessor to make it to Home computers. It was introduced during the year 1974 and it can perform 8 bit operations.

- Then during the year 1976, Intel introduced 8085 processors which is nothing but an update of 8080 processors.8080 processors are updated by adding two Enable/Disable Instructions, Three added interrupt pins and serial I/O pins.

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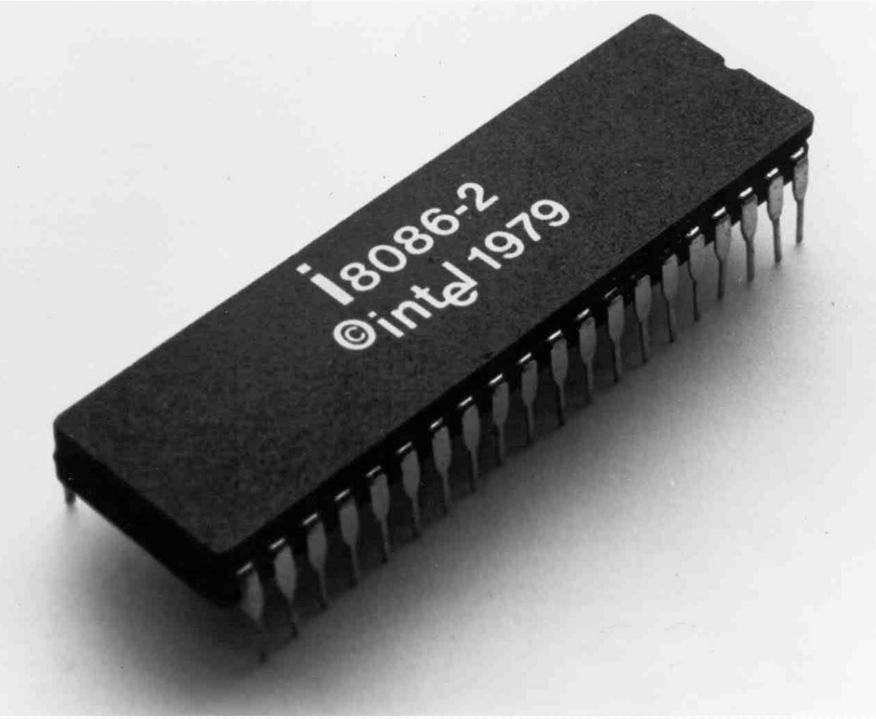
- Intel introduced 8086 pins during the year 1976. The major difference between 8085 and 8086 processor is that 8085 is an 8 bit processor, but 8086 processor is a 16 bit processor.



Introduction

- The **greatest advantage** of the above processors are that it do not contain Floating point instructions. Here floating point refers to the radix point or decimal point. For example: 123.456 is a floating point representation. Processors such as 8085 and 8086 do not support such representations and instructions.

- Intel later introduced 8087 processor which was the first math co-processor and later the 8088 processor which was incorporated into IBM personal computers.

Introduction

- As the years progressed lots of processors from 8088, 80286, 80386, 80486, Pentium II, Pentium III, Pentium IV and now Core2Duo, Dual Core, Quad core processors and core I3, core I5 and core I7 are the latest in the market.

- Apart from Intel, there are some other manufacturers who produce the CMOS version of 8085 microprocessor. Such manufacturers are called second source manufacturers.

Introduction

- The second source manufacturers include: AMD ,Mitsubishi ,NEC, OKI, Toshiba and Siemens.
- CMOS stands for complementary metal oxide semiconductor. It is a technology used in Microprocessors and Microcontrollers for making Integrated circuits
- The devices which are made of CMOS have high immunity towards noise and the static power consumption is low.

Introduction

A microprocessor system:

- Like any other system, a microprocessor has inputs, outputs and a process.
- The inputs and outputs of a microprocessor are a series of voltages that can be used to control external devices.
- The process involves analyzing the input voltages and using them to decide on the required output voltages.

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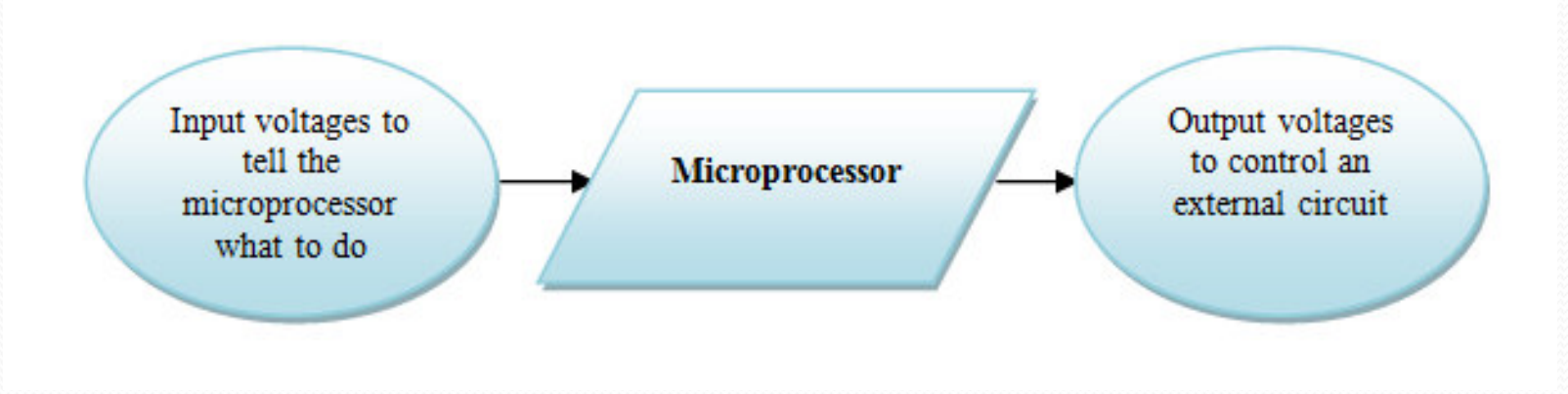
- The decision is based on previously entered instructions that are followed quite blindly, sensible or not.



Introduction

Terminology:

An electronic circuit fabricated out of a solid block of semiconductor material. This design of circuit, often called a solid state circuit, allows for very complex circuits to be constructed in a small volume. An integrated circuit is also called a (chip).

Introduction

Microprocessor-based system

- This is any system that contains a microprocessor, and does not necessarily have anything to do with computing. In fact, computers use only a small proportion of all the microprocessors manufactured.

- For example: Our garage door opening system is a microprocessor-based system or is sometimes called a microprocessor- controlled system.

Introduction

Microcomputer

- The particular microprocessor-based systems that happen to be used as a computer are called microcomputers. The additional circuits required for a computer can be built into the same integrated circuit giving rise to a single chip microcomputer.

Microcontroller

- This is a complete microprocessor-based control system built onto a single chip. It is small and convenient but doesn't do anything that could not be done with a microprocessor and a few additional components.

Introduction

CPU and MPU

- **C.P.U.=central processing unit**.
  - A central processing unit (CPU), or sometimes simply processor, is the component in a digital computer that interprets computer program instructions and processes data.

- **M.P.U=micro processing unit.**
  - A microcontroller (or MCU) is a computer-on-a-chip used to control electronic devices.

Introduction

- From the above terminologies, we can draw the following block diagram to represent the microcomputer and a microprocessor-based system is apart from it. Microcomputer a computer with a microprocessor as its CPU, and includes memory, I/O etc.

- Inside the Microprocessor, Internally, the microprocessor is made up of three main units represented by the Arithmetic/Logic Unit (ALU), the Control Unit (CU), and an array of registers for holding data while it is being manipulated.

Introduction

That mean the Microprocessor is silicon chip which includes ALU, register circuits & control circuits. While Microcontroller silicon chip which includes microprocessor, memory, and I/O in a single package.

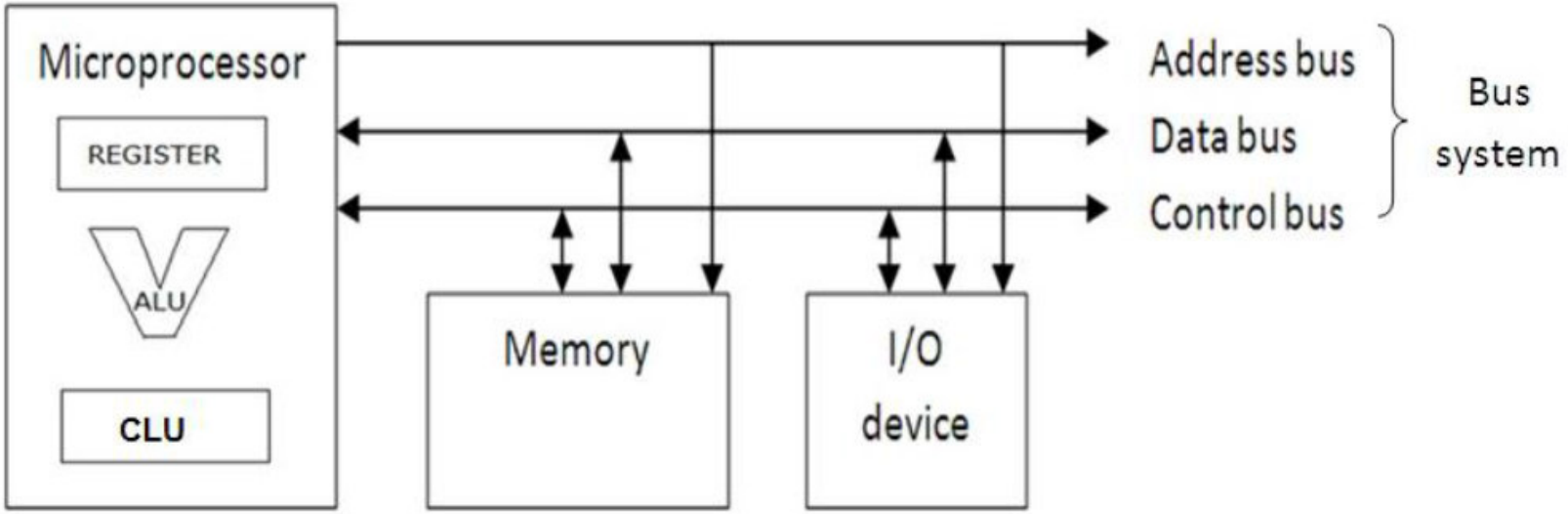


Figure 1.1 Microprocessor-based system

Introduction

Micro (small)

- The word micro is used in electronics and in science generally, to mean: one-millionth, or 1 : 106. It has also entered general language to mean something very small like a very small processor or microprocessor. It has also become an abbreviation for micro-processor, microcomputer, microprocessor-based system or a micro- controller, indeed almost anything that has (micro) in its name

Introduction

- In the scientific sense, the word micro is represented by the Greek letter ( ). It was only a small step for microprocessor to become abbreviated to P. Some confusion can arise unless we make sure that everyone concerned is referring to the same thing.


The End