First lecture

An introduction to microcomputer architecture

**What is a Computer?**

An electronic device that accepts input, stores large quantities of data, execute complex instructions which direct it to perform mathematical and logical operations and outputs the answers in a human readable form. Computer system hardware divides naturally into four major internal sections:

1. The central processing unit ("CPU"). The CPU contains the working registers and performs the arithmetic and logic functions.
2. The memory/storage. The memory contains instructions (software) and data and is divided into subsections (e.g., RAM and Disk) according to speed.
3. The user interface components (input/output). Display, mouse, keyboard, and printer are the focal point of interaction between users and the machine.
4. The network interface components. The network, if present, provides access to external resources that may be in the same room or anywhere around the world.

**Input Device**

**Output Device**

**I/O Port**

**Memory**

**ALU**

**CU**

**DATA Bus**

**ADDRESS Bus**

**CPU**

**General Artchitecture of microcomputer system**

**Microcomputer Architecture component:-**

**Input/output***:-*

* The I/O section allows the computer to take in data from the outside world or send data to the outside world.
* Peripherals such as keyboards, video display terminals, printers are connected to I/O port.

**Processor***:*

The part of a computer which controls all the other parts. The CPU fetches instructions from memory, decodes and executes them. This may cause it to transfer data to or from memory or to activate peripherals to perform input or output.

**Accumulators***:*

 Are special classes of register which are closely connected with the ALU such that arithmetic and logical operations can be easily performed on their contents.

**CU***:*

A control unit is circuitry that directs operations within a computer's processor. It lets the computer's logic unit, memory, as well as both input and output devices know how to respond to instructions received from a program.

**Memory***:*

A unit of a computer in which data is stored for later use, The store of things learned and retained from an organism's activity or experience as evidenced by modification of structure or behavior or by recall and recognition.

**Bus Interface Unit (BIU)***:*

BIU (Bus Interface Unit) within the MPU fetches new instruction or data as necessary. It is also the BIU jobs to interpret or decode instruction and to route results to their proper destination.

**Registers***:*

Registers are storage elements, some of which have specific functions owing to the way in which they are implemented in hardware or the task they have to perform.

* Data registers - can be assigned to a variety of functions by the programmer.They can be used with any machine instruction that performs operations on data.
* Address register - Address registers are designed to make it easy to index into the array of constant registers. The address registers allow you to provide a signed integer offset into the constant registers.

**System bus**

A **system bus** is a single [computer bus](https://en.wikipedia.org/wiki/Bus_%28computing%29) that connects the major components of a computer system, combining the functions of a [data bus](https://en.wikipedia.org/wiki/Memory_bus) to carry information, an [address bus](https://en.wikipedia.org/wiki/Address_bus) to determine where it should be sent, and a [control bus](https://en.wikipedia.org/wiki/Control_bus) to determine its operation.

In [computer architecture](http://en.wikipedia.org/wiki/Computer_architecture), a **bus**  is a communication system that transfers data between components inside a [computer](http://en.wikipedia.org/wiki/Computer), or between computers. This expression covers all related hardware components (wire, optical fiber, etc.) and software, including communication protocols.

There are three types of Bus:

* **Address Bus (AB)**: the width of AB determines the amount of physical memory addressable by the processor.
* **Data Bus (DB)**: the width of DB indicates the size of the data transferred between the processor and memory or I/O device.
* **Control Bus (CB)**: consists of a set of control signals, typical control signals includes memory read, memory write, I/O read, I/O write, interrupt acknowledge, bus request. These control signals indicates the type of action taking place on the system bus.

