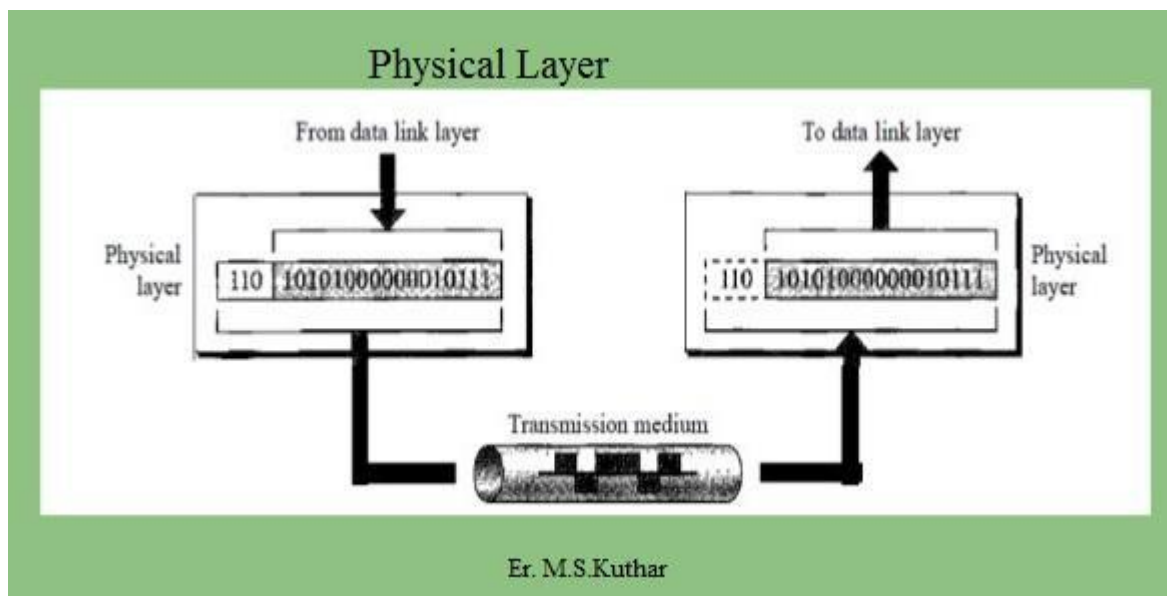


Physical Layer And its Components

Definition of physical layer:

The physical layer is aimed at consolidating the hardware requirements of a network to enable the successful transmission of data. The physical layer sometimes plays an important role in the effective sharing of available communication resources and helps avoid contention among multiple users. It also handles the transmission rate to improve the flow of data between a sender and receiver.



The physical layer provides the following services:

- Modulates the process of converting a signal from one form to another so that it can be physically transmitted over a communication channel
- Bit synchronization for synchronous serial communications
- Start-stop signaling and flow control in asynchronous serial communication
- Circuit switching and multiplexing hardware control of multiplexed digital signals
- Transmission mode control

Examples of protocols that use physical layer include:

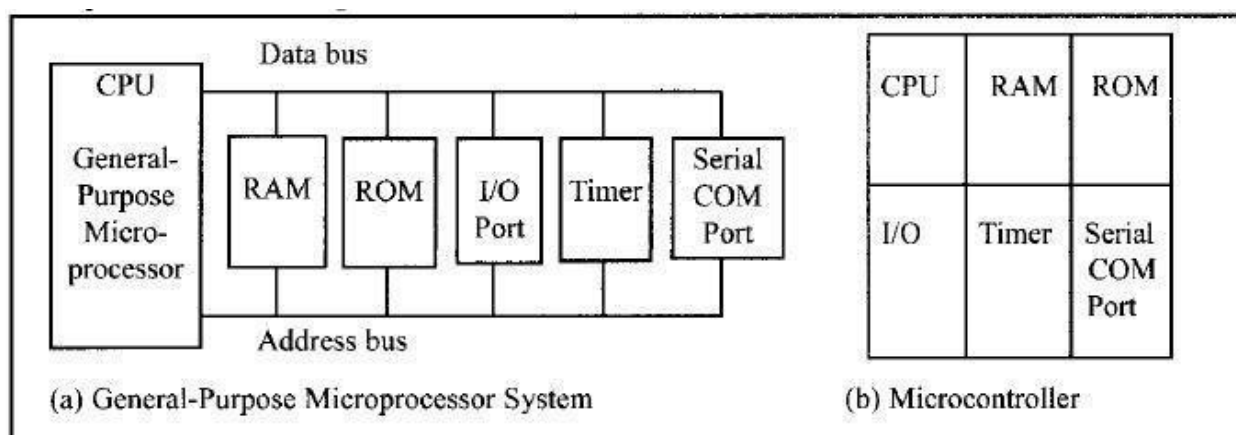
- Integrated Services Digital Network (ISDN)
- Universal Serial Bus
- Bluetooth
- Ethernet
- Infrared Data Association

CPU	RAM	ROM
I/O Port	Timer	Serial COM Port

2.2) Introduction to Microcontroller and Microprocessors:-

Microprocessors:-

A microprocessor is a single VLSI chip having a CPU. Also, it may have other units such as caches, floating-point processing arithmetic units, and pipelining units that help in faster processing of instructions. Earlier generation microprocessors' fetch-and-execute cycle was guided by a clock frequency of the order of ~1 MHz. Processors now operate at a clock frequency of 2GHz



2.2.1) Types of Processors:-

Processors can be of the following categories:-

- Microprocessor
- Microcontroller
- Embedded Processor
- Digital Signal Processor
- Media Processor
- Application-Specific System Processor (ASSP)
- Application-Specific Instruction Processors (ASIPs)
- GPP core(s) or ASIP core(s) on either an Application Specific Integrated Circuit (ASIC) or a Very Large Scale Integration (VLSI) circuit.

Microcontroller:-

- A microcontroller is a single-chip VLSI unit (also called microcomputer) which, although having limited computational capabilities, possesses enhanced input/output capability and several on-chip functional units.
- Microcontrollers are particularly used in embedded systems for real-time control applications with on-chip program memory and devices.

2.2.2) Types of Microcontroller:-

- PIC Microcontroller
- ARM Microcontroller
- 8051 Microcontroller
- MSP Microcontroller
- AVR Microcontroller, etc

Microprocessor vs Microcontroller:

- Microprocessors are multitasking in nature. Can perform multiple tasks at a time. For example, on a computer, we can play music while writing text in a text editor. Single task-oriented. For example, a washing machine is designed for washing clothes only.
- The 8051 microcontrollers work with an 8-bit data bus. So they can support external data memory up to 64K and external program memory of 64k at best. Collectively, 8051 microcontrollers can address 128k of external memory.
- When data and code lie in different memory blocks, then the architecture is referred to as Harvard architecture. In case data and code lie in the same memory block, then the architecture is referred to as Von Neumann architecture.

2.2.3) Differences between Microprocessors and Microcontroller

Microprocessor	Microcontroller
Microprocessors are multitasking in nature. Can perform multiple tasks at a time. For example, on computer we can play music while writing text in text editor.	Single task oriented. For example, a washing machine is designed for washing clothes only.
RAM, ROM, I/O Ports, and Timers can be added externally and can vary in numbers.	RAM, ROM, I/O Ports, and Timers cannot be added externally. These components are to be embedded together on a chip and are fixed in numbers.
Designers can decide the number of memory or I/O ports needed.	Fixed number for memory or I/O makes a microcontroller ideal for a limited but specific task.
External support of external memory and I/O ports makes a microprocessor-based system heavier and costlier.	Microcontrollers are lightweight and cheaper than a microprocessor.
External devices require more space and their power consumption is higher.	A microcontroller-based system consumes less power and takes less space.