Computer Fundamental

UNIT : 02

InPUT DEVICE
&
DATA STORAGE

-By Hiral Pandya

INPUT DEVICES :

- An input device is essentially a piece of hardware that sends data to a computer. Most input devices either interact with or control the computer in some way.

- ***The most common input devices are the MOUSE and the KEYBOARD***.

- The key distinction between an input device and an output device is that the former sends data to the computer, whereas the latter receives data from the computer.

- Input and output devices that provide computers with additional functionality are also called peripheral or auxiliary devices.

TYPES OF INPUT DEVICES :

✓Keyboard
✓Mouse
✓Scanner
✓Joystick
✓Light Pen
✓Digitizer
✓Microphone
✓Magnetic Ink Character Recognition (MICR)
✓Optical Character Reader (OCR)

✓Digital Camera
✓Paddle
✓Steering Wheel
✓Gesture recognition devices
✓Light Gun
✓Touch Pad
✓Remote
✓Touch screen
✓VR (Virtual Reality)
✓Webcam
✓Biometric Devices

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INPUT DEVICES : LIGHT PEN
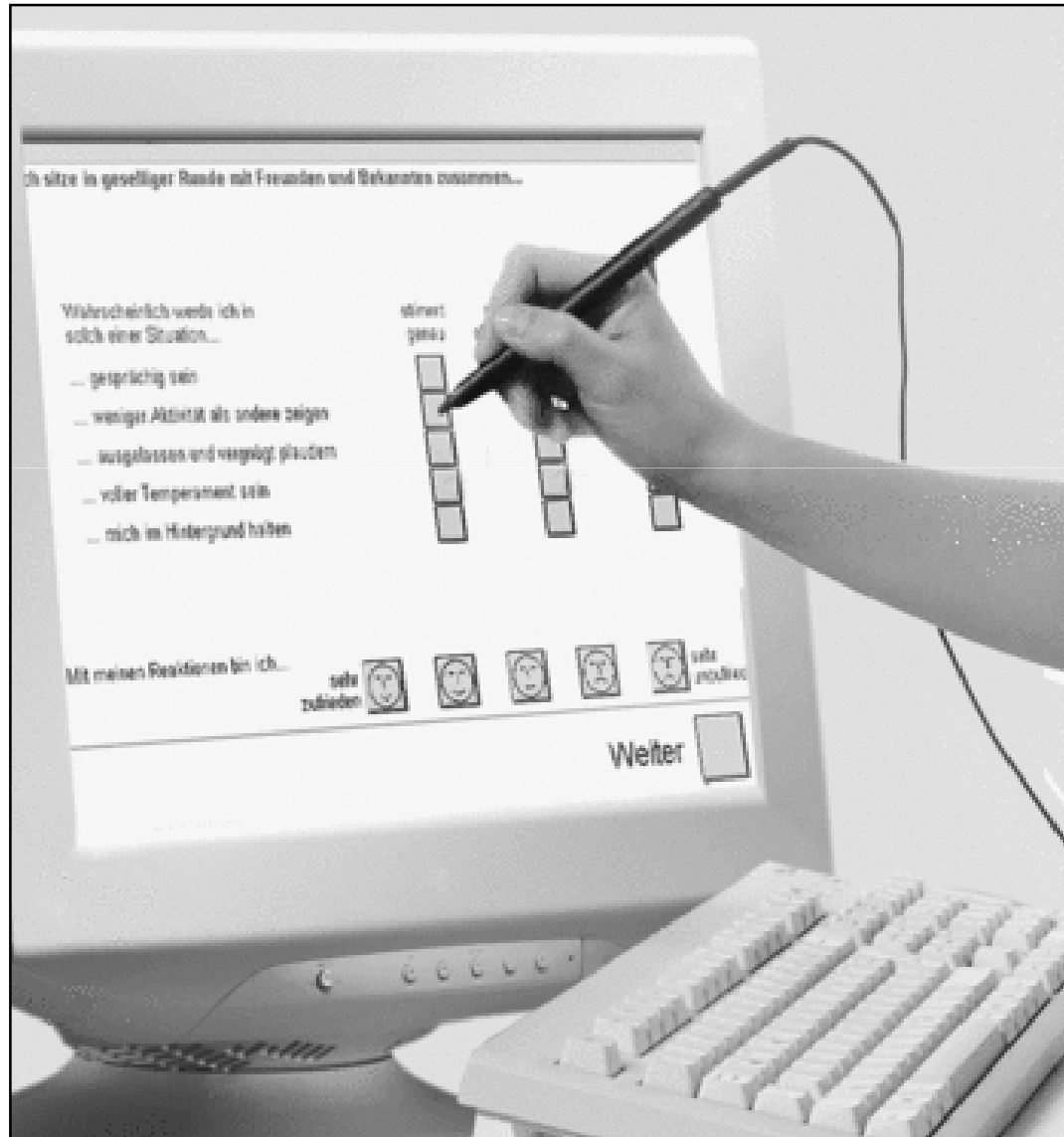
INPUT DEVICES : DIGITIZER

INPUT DEVICES : MICR

INPUT DEVICES : PADDLE

INPUT DEVICES : LIGHT GUN

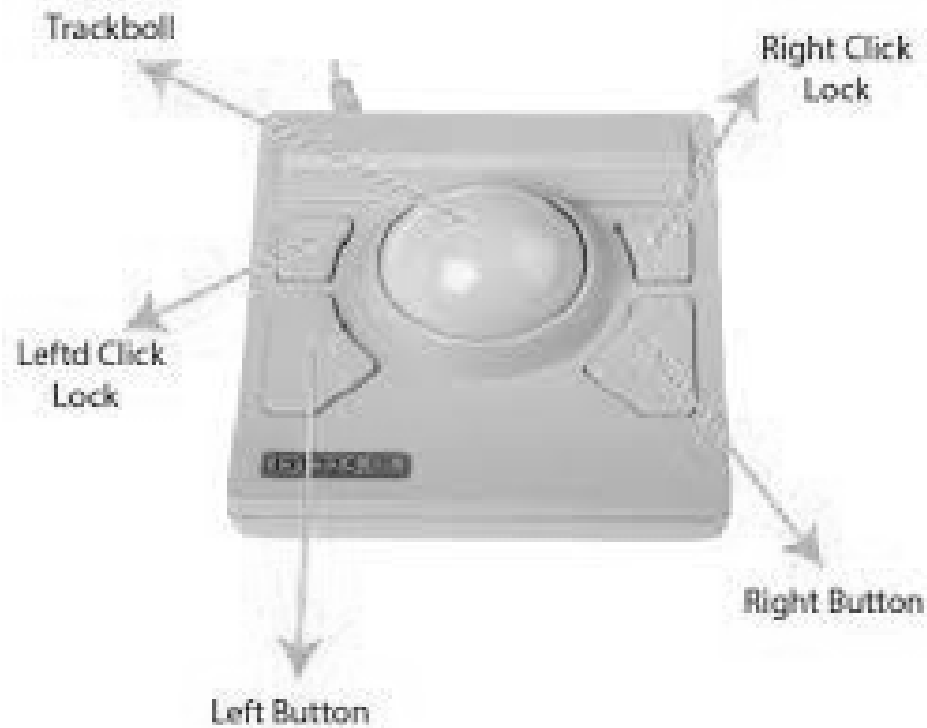# INPUT DEVICES : VR
(VIRTUAL REALITY)

INPUT DEVICES :
TRACKBALL

- A trackball is a computer cursor control device used in many notebook and laptop computers.

- ***The trackball is usually located in front of the keyboard toward the user***.

- Essentially, the trackball is an upside-down mouse that rotates in place within a socket.

- The user rolls the ball to direct the cursor to the desired place on the screen and can click one of two buttons (identical to mouse buttons) near the trackball to select desktop objects or position the cursor for text entry.

- IBM's ThinkPad series of notebook computers uses a "***pointing stick***", called a ***TrackPoint***, that is integrated into the middle of the keyboard keys.

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Trackboll

Right Click Lock

Leftd Click Lock

Right Button

Left Button

INPUT DEVICES :
GLIDE-PAD

- It is also called a touchpad, glide point, pressure-sensitive tablet, or trackpad.

- A touchpad is **an input device on laptops and some keyboards**.

- It allows the user to move a cursor with their finger. It can be used in place of an external mouse.

INPUT DEVICES :
POS TERMINAL

- POS Stands for *POINT OF SALE*, is a computerized replacement for a cash register.

- Much more complex than the cash registers of even just a few years ago, the POS system can include the ability to record and track customer orders, process credit and debit cards, connect to other systems in a network, and manage inventory.

- Generally, a POS terminal has as its core a personal computer, which is provided with application-specific programs and I/O devices for the particular environment in which it will serve.

- A POS system for a restaurant, for example, is likely to have all menu items stored in a database that can be queried for information in a number of ways.

INPUT DEVICES :
POS

INPUT DEVICES :
MIDI KEYBOARD

- MIDI Stands for **Musical Instrument Digital Interface**.

- A MIDI keyboard is a device that can send commands to a MIDI-equipped device. When you press a key or pad, it creates a MIDI message.

- The message is sent to the device it's connected to with the use of either a USB or MIDI cable.

- Some MIDI keyboards have additional programmable pads, encoders, and faders, giving you more functionality both the studio and on stage.

- In the end, they all achieve the same goal IS composing and performing MUSIC.

INPUT DEVICES :
MIDI KEYBOARD

INPUT DEVICES :
WIRELESS KEYBOARD & MOUSE

- A wireless keyboard or mouse is/are computer keyboard that allows the user to communicate with computers, tablets, or laptops with the help of **RADIO FREQUENCY (RF)**, such as Wi-Fi and Bluetooth or with **INFRARED (IR)** technology.

- Wireless keyboard / mouse based on infrared technology use light waves to transmit signals to other infrared-enabled devices.

- A wireless keyboard can be connected using RF technology with the help of two parts, a transmitter and a receiver.

- The radio transmitter is inside the wireless keyboard. The radio receiver plugs into a keyboard port or USB port. Once the receiver and transmitter are plugged in, the computer recognizes the keyboard and mouse as if they were connected via a cable.

SCANNER

- Scanner is computer input device that uses a light beam to scan codes, text, or graphic images directly into a computer or computer system.
- Very high resolution scanners are used for scanning for high-resolution printing, but lower resolution scanners are adequate for capturing images for computer display.
- Types Of Scanner :

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- OCR stands for **OPTICAL CHARACTER RECOGNITION.**

- A OCR system is able to recognize numerous kinds of printed characters and text fonts from both computers and typewriters. Advanced OCR systems can even identify handwriting.

- An OCR system compares the dark and light aspects of this bitmap in order to determine each alphanumeric character.

INPUT DEVICES :
SCANNER : OMR

- OMR stands for **OPTICAL MARK READER.**
- Optical mark recognition (OMR) is an electronic method of gathering human-handled data by identifying certain markings on a document. Usually the optical mark recognition process is achieved with the aid of a scanner that checks the transmission or reflection of light through the paper.
- An OMR scanner can maintain a throughput of 1,500 to 10,000 forms per hour.
- This activity can be controlled and processed by a single PC workstation, which can handle any volume the scanner can generate.
- Increasing the throughput simply requires upgrading the scanner.

SCANNER : MICR

- MICR stands for **Magnetic Ink Character Recognition /Reader.**

- MICR is a technology used to verify the authenticity or originality of paper documents, especially *BANK CHEQUES*. Special ink, which is sensitive to magnetic fields, is used in the printing of certain characters on the original documents.

- Information can be encoded in the magnetic characters.

- The use of MICR can enhance security and minimize the losses caused by some types of crime.

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INPUT DEVICES :
SCANNER : OBR

- OBR stands for **Optical BarCode Reader.**

- OBR is used for reading bar-coded data. It scans a set of vertical bars of different width for specific data and is used to read tags.

- Bar code reading is done by a light pen or scanner connected to a computer.

- A barcode is a set of lines of different widths and sizes representing data, that when read help identify the scanned object.

- Barcodes are often used to help organize and index

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DATA STORAGE :

- Computer data storage is a technology consisting of computer components and recording media that are used to retain digital data.

- Data storage essentially means that files and documents are recorded digitally and saved in a storage system for future use.

- Storage systems may rely on electromagnetic, optical or other media to preserve and restore the data if needed.

- Data storage can occur on physical hard drives, disk drives, USB drives or virtually in the cloud.

FLOPY DISK

- Floppy disks, sometimes called flexible disks or diskettes, can store between a few hundred thousand and several million characters of information.

- It takes only about a tenth of a second for a floppy disk drive to retrieve any piece of data directly.

- The disk's small size and low cost helped generate the personal computer revolution in the late 1970s.

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MAGNETIC STORAGE DEVICES
FLOPY DISK

HARD DISK

- A hard disk drive (HDD) is a **NON-VOLATILE** computer storage device containing magnetic disks or platters rotating at high speeds.

- It is a secondary storage device used to store data permanently, random access memory (RAM) being the primary memory device.

- ***Non-volatile means data is retained when the computer is turned off.***

- There are major two types of HDD:

  – SATA HDD

  – SSD HDD

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HARD DISK : SATA HDD

- A SATA hard drive is a type of rewritable mass storage device characterized by respectable transmission speeds, excellent storage capacities and flawless support by all operating systems and computer motherboards.

- It can write to the disk with an interface rate of **6gb/s** with a throughput of **600MB/S**.
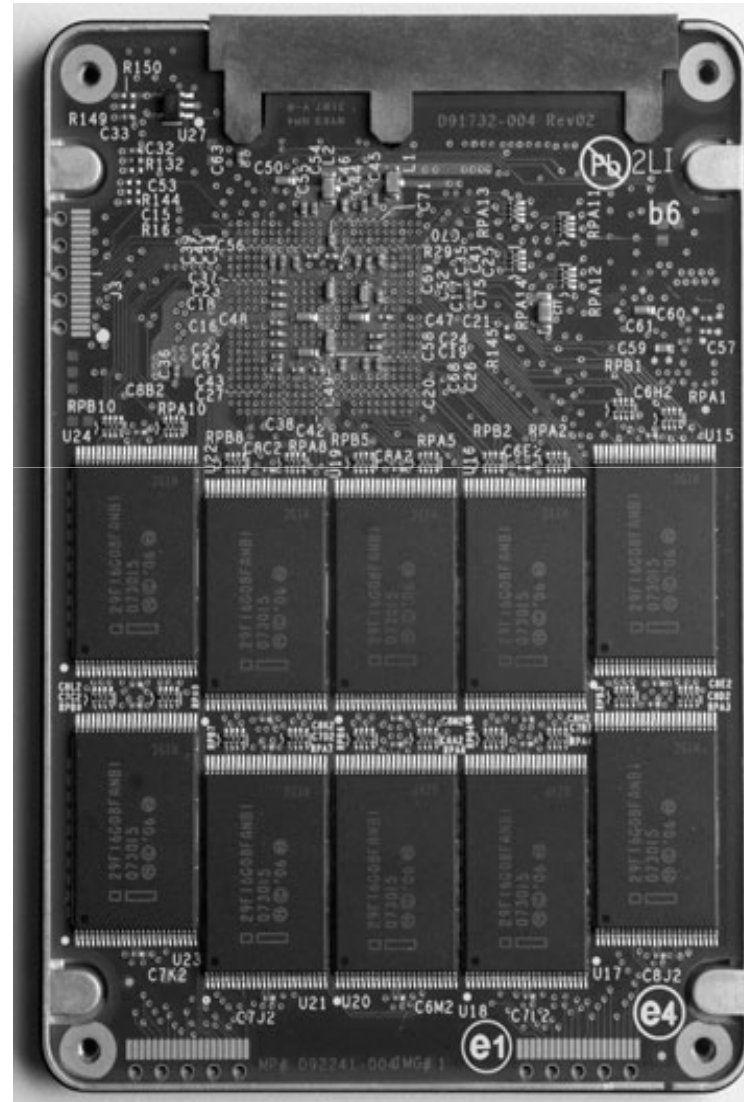

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HARD DISK : SSD DISK

- SSD stands for **Solid State Drive**. These disks don't have any moving parts.

- Instead, all of the data is stored on non-volatile flash memory.

- That means that there isn't a **needle** that has to move to read or write data and that they are significantly faster than SATA drives.
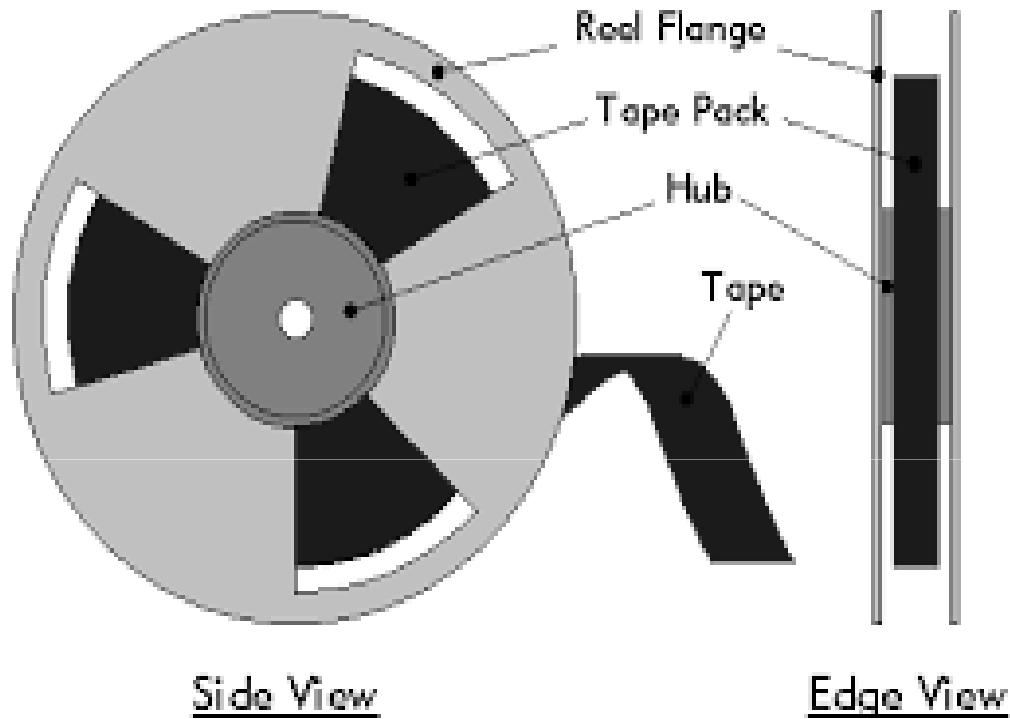
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MAGNETIC TAPE

- Magnetic tape is a type of physical storage media for different kinds of data.

- It is considered **AN ANALOG SOLUTION**, in contrast to more recent types of storage media, such as solid state disk (SSD) drives.

- Magnetic tape has been a major peripheral for audio and binary data storage, and is still part of data storage for some systems.

- Originally, magnetic tape was designed to record sound. In computing, it holds binary data.

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MAGNETIC TAPE

Reel Flange

Tape Pack

Hub

Tape

Side View

Edge View

MAGNETIC DISK

- A magnetic disk is a storage device that uses a magnetization process to write, rewrite and access data.

- It is covered with a magnetic coating and stores data in the form of tracks, spots and sectors.

- A magnetic disk primarily consists of a rotating magnetic surface (**called PLATTER**) and a mechanical arm that moves over it.

- Together, they form a **"COMB"**. The mechanical **ARM** is used to read from and write to the disk.

- The data on a magnetic disk is read and written using a magnetization process.

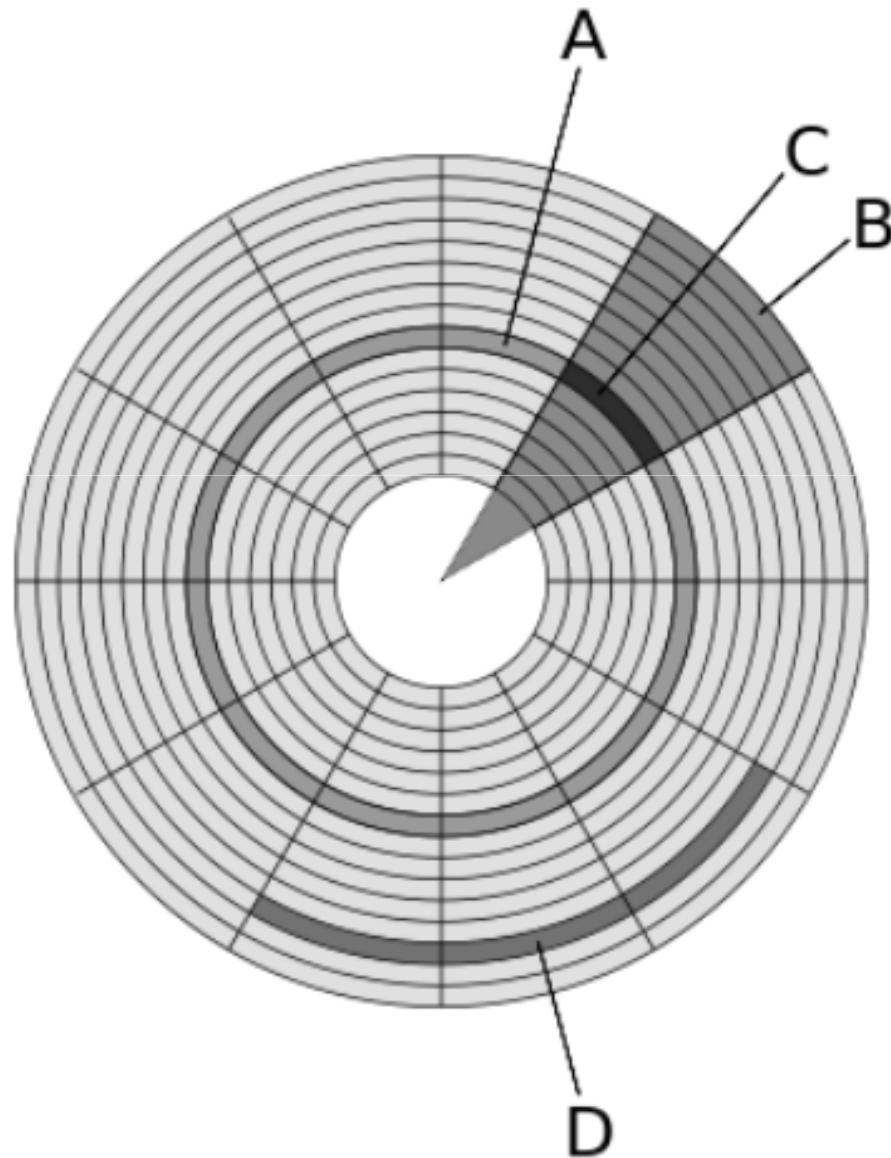**– By : Hiral Pandya**

MAGNETIC DISK
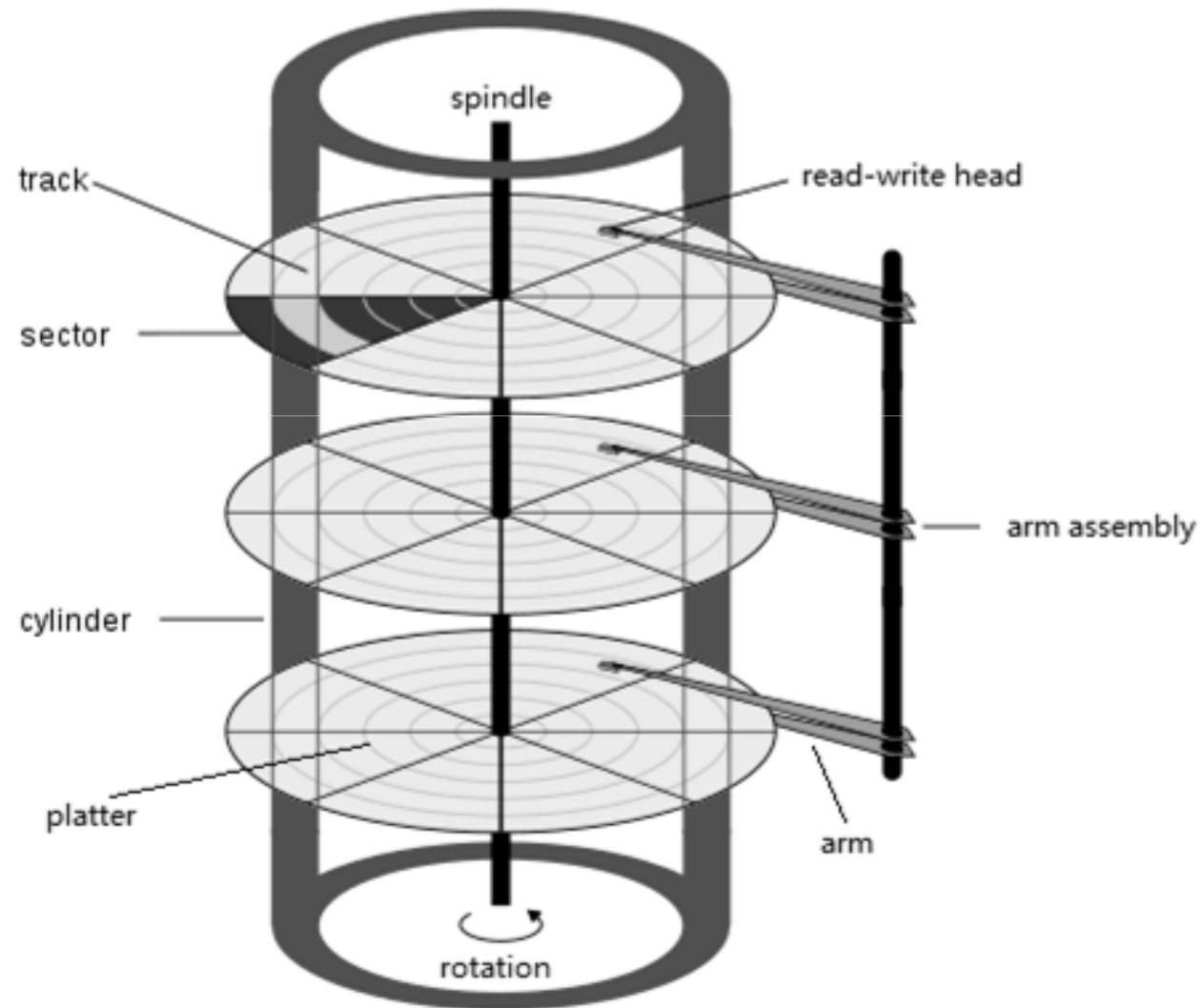
STORAGE MECHANISM

- Magnetic storage or magnetic recording is the storage of data on a magnetized medium. Magnetic storage uses different patterns of magnetization in a magnetizable material to store data and is a form of non-volatile memory. The information is accessed using one or more read/write heads.
- Magnetic storage media, primarily hard disks, are widely used to store computer data as well as audio and video signals.
- In the field of computing, the term magnetic storage is preferred and in the field of audio and video production, the term magnetic recording is more commonly used.
- The distinction is less technical and more a matter of preference. Other examples of magnetic storage media include floppy disks, magnetic tape, and magnetic stripes on credit cards.

STORAGE MECHANISM

(A) Track
(B) *Geometrical* **sector**
(C) Track sector
(D) **Cluster**

STORAGE MECHANISM
(TRACKS)

- A disk drive track is a circular path on the surface of a disk or diskette on which information is magnetically recorded and from which recorded information is read.

- A track is a physical division of data in a disk drive, as used in the **Cylinder-Head-Record** addressing mode of a disk.

- The concept is concentric, through the physical platters, being a data circle per each cylinder of the whole disk drive.

- In other words, the number of tracks on a single surface in the drive exactly equals the number of cylinders of the drive.

STORAGE MECHANISM
(SECTOR)

- In computer disk storage, a sector is a subdivision of a track on a magnetic disk or optical disc.

- Each sector stores a fixed amount of user-accessible data, traditionally 512 bytes for hard disk drives (HDDs) and 2048 bytes for CD-ROMs and DVD-ROMs.

- Newer HDDs use 4096-byte (4 KB) sectors, which are known as the **Advanced Format (AF)**.

- The sector is the minimum storage unit of a hard drive.

- Most disk partitioning schemes are designed to have files occupy an integral number of sectors regardless of the file's actual size

STORAGE MECHANISM
(CLUSTER)

- In personal computer storage technology, a cluster is the logical unit of file storage on a hard disk. it's managed by the computer's operating system.

- Any file stored on a hard disk takes up one or more clusters of storage. A file's clusters can be scattered among different locations on the hard disk. The clusters associated with a file are kept track of in the hard disk's **file allocation table (FAT)**.

- Since a cluster is a logical rather than a physical unit (it's not built into the hard disk itself), the size of a cluster can be varied.

- The maximum number of clusters on a hard disk depends on the size of a FAT table entry.

- Beginning with DOS 4.0, the FAT entries were 16 bits in length, allowing for a maximum of 65,536

- Cylinder is set of all the TRACKS on a HARD DISK drive with multiple PLATTERS that may be read at the same time.

- All the tracks are the same distance from the central spindle, so they can be imagined as tracing a cylinder in space.

- The HEADS on all the platters move together in a parallel motion – a sequence of data stored within

READING AND WRITING DATA
TO AND FROM STORAGE DEVICES

- Read/Write (R/W) refers to devices or storage media that can be read from and written to with data.

- This simple designation is part of hardware production and design, as well as computing system functionality and related devices.

- The R/W dichotomy represents a very basic type of computer function. Even the most primitive computers had this built-in functionality, so that users could input data, enable computer operations and access data results.

- Over time, this has advanced into data and hardware environments where massive data centers work with advanced data analytics tools and systems to offer R/W functionality, as well as analytics.

SEEK TIME / ROTATIONAL DELAY – LATENCY / ACCESS TIME / RESPONSE TIME

- The disk is divided into tracks. Each track is further divided into sectors. **The point to be remembered here is that outer tracks are bigger in size than the inner tracks but they contain the same number of sectors and have equal storage capacity**.

- This is because the storage density is high in sectors of the inner tracks where as the bits are sparsely arranged in sectors of the outer tracks.

- Some space of every sector is used for formatting. So, the actual capacity of a sector is less than the given capacity.

- Read-Write(R-W) head moves over the rotating hard disk. It is this Read-Write head that performs all the read and write operations on the disk and hence, position of the R-W head is a major concern.

SEEK TIME / ROTATIONAL DELAY – LATENCY / ACCESS TIME / RESPONSE TIME

- ***Seek time :*** The time taken by the R-W head to reach the desired track from it's current position.

- ***Rotational latency :*** Time taken by the sector to come under the R-W head.

- ***Data transfer time :*** Time taken to transfer the required amount of data. It depends upon the rotational speed.

- ***Controller time :*** The processing time taken by the controller.

- ***Average Access time :*** seek time + Average Rotational latency + data transfer time + controller time.

- **AVERAGE ROTATIONAL LATENCY IS MOSTLY (1/2) X (ROTATIONAL LATENCY).**

Computer Fundamental

END OF UNIT - 02

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