# UNIT-4 INPUT OUTPUT DEVICES

Contains:

- Introduction Definition and uses of input/output devices.
- Input Devices What is input device?
- Human Data Entry Devices Keyboard, mouse, trackball, joystick, digitizing tablet, light pen, touch screen.
- Source Data Entry Devices Speech recognition, digital camera, scanner, OCR, OMR, MICR, barcode reader.
- Output Devices Hard copy devices – printer (different types), plotter. Soft copy devices – Monitor, projector,

# INPUT DEVICES

- Any hardware device that sends data to the computer is known as input device
- Input devices are what allows us to interact with a computer
- Input devices helps to add new information to a computer
- Commonly used input devices are keyboard, mouse, microphone etc.
- **Human Data Entry Devices**: Keyboard, mouse, trackball, joystick, digitizing tablet, light pen, touch screen.
- **Source Data Entry Devices**: Speech recognition, digital camera, scanner, OCR, OMR, MICR, barcode reader

# Input Device :

***The device used to accept the data and instructions from the user is called input device.***

- An input device is used to feed data into computer.
- Input devices are capable of converting data into a form which can be recognized by computer.
- A computer has several input device namely, Keyboard, Mouse, Trackball, Joystick, Scanner, Light pen, Bar Code Reader, OCR, OMR, MICR etc.

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# Input Device :

Devices used to input general types of data:

- Personal computer input devices
- Speech recognition technology
- Digital cameras
- Scanning devices
- Optical data readers
- Magnetic ink character recognition (MICR) devices
- Magnetic stripe card


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# Computer Keyboard

***The most common input device is the keyboard.***

- It is used to enter both numerical and character type data.
- It is like a mechanical type writer with **alpha numeric and special keys, punctuation keys, functional keys to perform specific.**
- **The keyboards contain 101 keys or 104 keys.**
- The keyboard detects the key pressed and generates the corresponding ASCII codes which can be recognized by the computer.


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# Types of keyboard

➢**Standard keyboard: The standard keyboards have their basic layout. The average number of** keys on a regular keyboard is 105/108; QWERTY keyboards are the most common and have the six alphabets Q, W, E, R, T, and Y in the first row.

➢**Wireless keyboard: It is a keyboard that does not need to connect to the computer via a wire.** This makes very convenient for the use the keyboard comfortably. Wireless keyboard use Bluetooth, Infrared (IR) to connect to the computer.

➢**Ergonomics: It refers to study of method that can reduce stress on muscles to avoid repetitive** strain injury. It mostly deals with optimizing posture and technique while working, so the work can be carried out in the easiest manner.

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# Types of keyboard

➢**Virtual keyboard: It is a software device that led to use input data just like hardware** keyboard. They open up as an application and can be controlled by a mouse or wire touch screen.

➢**Compact keyboard: These keyboards are slim and usually do not have the numerical keypad** that is present on the right side of the keyboard these are typically used in laptops.

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# MOUSE

Mouse is an input device that controls the movement of the cursor on the display screen.

- MOUSE stands for "**Mechanically Operated User Serial Engine**".
- The Mouse is used as a pointing device.
- Mouse is a small device; you can roll/navigate along a flat surface.
- In a mouse, a small ball/IR rays is kept inside and touches the pad through a hole at the bottom of the mouse.
- There are two types of mouse.
  - Mechanical
  - Optical

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# MOUSE

- There are two types of mouse.
  - Mechanical: This mouse has a small rubber ball underneath that moves against two rollers as it passes across a flat surface.
  - Optical: This mouse more accurate and has no moving parts. Ts use a laser to detect movement.

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# JOYSTICK

***A joystick is an input device consisting of a stick that pivots on a base and reports its angle or direction to the device it is controlling.***

- The joystick can be moved in all four directions.
- The function of the joystick is similar to that of a mouse.
- It is mainly used in playing computer games.
- Joysticks are also used for controlling machines such as cranes, trucks, underwater unmanned vehicles, surveillance cameras and zero turning radius lawn movers.

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# SCANNER

***The scanner is an input device which works more like a photocopy machine.***

- It is used when some information is available on a paper and it is to be transferred to the computer for further manipulation.
- The scanner captures images from the source which are then converted into the digital form.

HP ScanJet Pro 2500 f1 Flatbed Scanner ...

ET16 Plus CZUR Book & ...

Brother ADS-2700W Wireless High-Speed ...

Pro Wireless Barcode Scan...

# Optical Mark Reading and Recognition (OMR)

***Optical Mark Reader is a device that reads pencil marks and converts them into computer processable form.***

- Special pre-printed forms are designed with boxes which can be marked with a dark pencil or ink. Such documents are read by a reader, which transcribes the marks into electrical pulses which are transmitted to the computer.
- They are widely used in applications like objective type answer papers evaluation in which large number of candidates appear, time shits of factory employees etc.

Fig: OMR Machine

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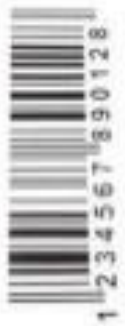
# Optical Character Recognition (OCR)

***The main use of these devices is to recognize alphabetic and numeric character printed on paper.***

- The OCR technique permits the direct reading of any printed character without any special ink. With OCR, a user can scan a page from a book.
- The computer will recognize the characters in the page as a letters and punctuations marks and stores.
- This can be edited using a word processor the size (width, height and depth) of the scanned.
- OCR's are used in applications such as Credit Card billing and reading of pin code numbers in large post office to sort mail geographically.

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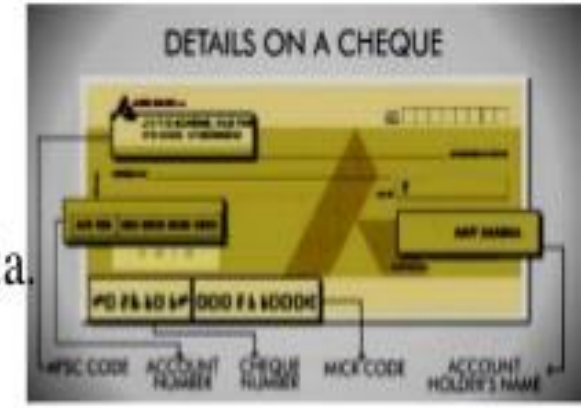
# Magnetic Ink Character Recognition (MICR)

***MICR is a form of character recognition that reads the text printed with magnetic charged ink.***

- The shapes of the characters by sensing the magnetic charge in the ink and translates these shapes into computer processed format.
- MICR is widely used by banks to process cheques.
- The cheque can be read using a special input unit, which recognizes magnetic ink characters.
- This method eliminates the manual errors.
- It also save time ensures security and accuracy of data.

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# USES OF INPUT DEVICE

- It is necessary to convert our information or data into a form which a computer can understand
- Without input devices computer is a brain with nothing to think about
- It helps to provide timely, accurate and useful data to the main memory in computer
- It helps to create a interaction of user to the computer

# OUTPUT DEVICES

- Any device that sends data from a computer to a user or another devices
- Output devices are those that provide us the result of the data that we send via input devices
- For example : Monitor, Printer

# Output device

***The device that displays output to the user is called output device.***

- When the data and instruction are fed into the computer and processed the next step is get the desired output.
- This output may be displayed on the monitor or printed on the computer.
- The output displayed on the monitor is called **soft copy output.**
- The output produced on a computer is called **hard copy output.**


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# Monitor

***It is commonly used output device sometimes called as display screen/VDU. Monitors are connected with the computer are similar in appears to a television set.***

- Monitor display image and text.
- The smallest dot that can be displayed is called a **pixel.**
- The resolution of the monitor determines the quality of the display. Some popular resolutions are 640X480 pixels, 800X600 pixels and 1024X768 pixels.
- The different size of the monitor is measured diagonally may be 12", 14", 17", 19", 21".

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# Monitor

The different types of monitors:

- CRT (Cathode Ray Tube)
- LCD (Liquid Crystal Display)
- TFT ( Thin Film Transistors)
- LED (Light Emitting Diode)


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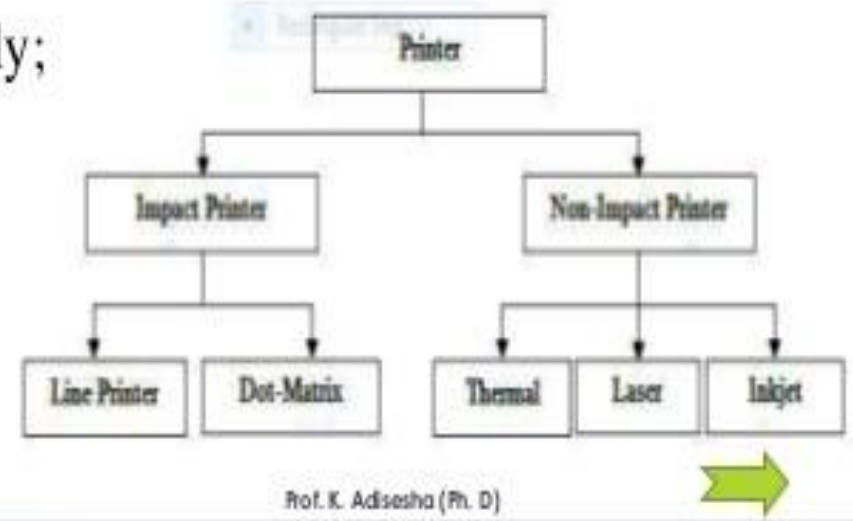
# Printer

Printer is an output device that prints text or images on paper.

- By printing you create a **'hard copy' of data.**
- There are different kinds of printers, which vary in their speed and print quality.
- The two main types of printer namely;
  - Impact Printers
  - Non Impact Printers.



# PRINTERS CONT…

- **Impact printers** involve mechanical components for conducting **printing**. While in **Non-Impact printers**, no mechanical moving component is used.

# Impact printers

***It includes printers that print by striking device against inked ribbon.***

- Impact printers use a print head containing a number of metal pins, which strike an inked ribbon placed between the print head and the paper.
- Line printers, dot-matrix printers are some of the impact printers.

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# Characteristics of Impact Printers

- In impact printers, there is physical contact with the paper to produce an image.
- Due to being robust and low cost, they are useful for bulk printing.
- Impact printers are ideal for printing multiple copies because they can easily print through many layers of papers.
- Due to its striking activity, impact printers are very noisy.
- Since they are mechanical in nature, they tend to be slow.
- Impact printers do not support transparencies.
- Measured with characters per second.

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# Line printer

***Line printers are high speed printers capable of printing an entire line at a time.***

- A line printer can print 150 lines to 3000 lines per minute.
- The limitations of line printers are they can print only one font, they can't print graphics.
- The print quality is low and they are noisy to operate.
- It can print large volume of text data very fast compared to the other printers.
- It is also used to print on multi part stationeries to prepare copies of a document.

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# Dot matrix printer

- The most popular serial printer is the dot matrix printer.
- It prints one line of 8 or 14 points at a time, with print head moving across a line.
- They are similar to typewriters. They are normally slow.
- The printing speed is around 300 characters per second.
- It uses multi part stationeries to prepare copies of a document.

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# Non impact printer

Non impact printer don't use striking device.

- The ink or semi –solid ink is stored in the printer cartridges and the flow of ink is controlled by the processor.
- It is much faster and can print color, different font and size also.

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# Characteristics of non impact printers

- They possess the ability to change type face automatically
- These printers produce high quality graphics.
- These printers usually support the transparencies.
- Measured in dots pen inches.
- The speed is calculated by the number of pages per minute (PPM).
- The size of the printing various A4, A3, A2, A0 and jumbo size.

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# Thermal printer

***Thermal printers are printers that produce images by pulling electrically heated pins against special heat-sensitive paper.***

- They are inexpensive and used widely in fax machine and calculators.
- Thermal printer paper tends to darken over time due to
- exposure to sunlight and heat. So the printed matters on the paper fade after a week or two.
- It also produces a poor quality print.

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# Laser printer

***Laser printer uses a laser beam and dry powered ink to produce a fine dot matrix pattern.***

- In can produce very good quality of graphics images.
- Laser printers print one entire page at a time and are typically faster and have better quality output.
- One of the chief characteristics o laser printer is their resolution- how many dots per inch (dpi) they lay down.
- The available resolutions range from 300 dpi at the low end to around 1200 dpi at the higher end.

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# Inkjet printer

- Inkjet printers use color cartridges which combine magenta, yellow and cyan links to create color tones.
- A black cartridge is also used for crisp monochrome output.
- Inkjet printers works by spraying ionizing ink at a sheet of paper.
- Magnetized plates in the ink's path direct the ink onto the paper in the described shape.
- It prints one line at a time. Print quality is high, speed is slow, typically about 100 CPS.

# Plotter

***Plotter is an output device that draws shapes on paper based on commands from a computer. Plotter differs from printers in that they draw lines using a pen.***

- As a result, they can produce continuous lines, whereas printers can only stimulate lines printing a closely spaced series of dots.
- Multicolor plotters use different colored pens to draw different colors.
- Plotters are more expensive than printers.
- They used in engineering applications.

# Speakers

***The speakers are the output device where the sound signals from analog/ digital are converted in to audible frequency in the speakers and produce voice output [audio data].***

- Using speakers along with speech synthesizer software, the computer can provide voice output.
- Voice output has become very common in many places like airlines, banks, automatic telephone enquiry system etc.
- Users can also hear music/songs using the voice output system.
- Namely 2.1 or 5.1 which indicates the position of the speakers and tracking systems.

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# USES OF OUTPUT DEVICES

- Output devices are used to display or provide the result that comes out of a computer
- Output devices converts electrical signals from a computer system into different forms like…
  - Image or text
  - Sound
  - Video etc.

# OUTPUT DEVICES

- **Hard copy devices** – printer (different types), plotter. **Soft copy devices** – Monitor, projector.

## Differences between Hardcopy and Soft Copy Devices

| Differences | Hard Copy | Soft Copy |
|---|---|---|
| 1. | Hard copy is a printed document file. | Soft copy is a non printed document file. |
| 2. | It is a physical copy. | It is a virtual copy. |
| 3. | It is treated as permanent copy. | It is treated as temporary copy. |
| 4. | Hard copy does not require an electronic interface like computers or mobiles etc to read and display. | Soft copy requires an electronic interface like computers or mobiles etc to read and display. |
| 5. | Hard copies are not easily portable like soft copy. | Soft copies are easily portable than hard copy. |

| | | |
|---|---|---|
| 6. | Hard copies occupies real physical space. | Soft copies does not occupy real physical space. |
| 7. | Hard copies can be shared directly in hand to hand or through post etc. | Soft copies can be shared through any digital sharing medium like Email, Whatsaap etc. |
| 8. | Hard copies are relatively expensive to generate/produce as compared to soft copies. | Soft copies are not expensive like hard copies to generate/produce. |
| 9. | These copies are mainly preferred in official works. | These copies are mainly preferred for private purposes. |
| 10. | Hard copies can not be converted into soft copies. | Soft copies can be converted into hard copies. |
| 11. | It has physical weight. Hard copies need physical space for storage. | It has no physical weight. Soft copies need computer memory space for storage. |

| 12. | Hard copies are not editable. | Soft copies are editable. |
|---|---|---|
| 13. | It is often subjected to wear and tear. | It is never subjected to wear and tear. |
| 14. | There is no chance of cyber attack data stealing. | There is huge chance of cyber attack data stealing. |
| 15. | Hard copies example includes books, official letters, notes, news papers, magazines etc. | Soft copies example includes ebooks, pdf files, word documents, presentation files, scanned copy etc. |

# OUTPUT DEVICES

## Comparison between Impact and Non Impact Printers

| BASIS OF COMPARISON | IMPACT PRINTERS | NON-IMPACT PRINTERS |
|---|---|---|
| **Description** | Impact printers form images and characters by striking a mechanism such as a print hammer or wheel against an inked ribbon, leaving an image on paper. | Non-impact printers form characters and images without direct physical contact between the printing mechanism and the paper. |
| **Printing Mechanism** | Printing in impact printers is done by hammering a metal pin or character dye. | Printing in non-impact printers is done by depositing ink on paper in any form. |
| **Speed** | They are low speed printers. They consume a lot of time to print a document. | They are very fast, they can print many pages per minute. |

| BASIS OF COMPARISON | IMPACT PRINTERS | NON-IMPACT PRINTERS |
|---|---|---|
| **Noise Level** | They have high level of noise because they have many moving parts and also the print head strikes on ribbon and paper. | They do not have high level of noise. The process of laying ink or toner onto paper is virtually silent. |
| **Printing Process** | They use pins, hammers or wheel to strike against an inked ribbon to print on a paper. | They use laser, spray of special ink or heat and pressure to print on paper. |
| **Print Quality** | Print quality of impact printers is lower than those of non-impact printers. | Print quality of non-impact printers is higher than those of impact printers. |
| **Printing Ink** | They use special inked ribbons to produce print on paper when print head strikes. | They use toner or cartridge for printing on paper. |

| BASIS OF COMPARISON | IMPACT PRINTERS | NON-IMPACT PRINTERS |
|---|---|---|
| **Technology** | They use old printing technologies. | They use latest printing technologies. |
| **Cost** | They are often less expensive. | They are often very expensive when compared to impact printers. |
| **Nature Of Paper Sheet Used** | They use continuous paper sheet. | They often use individual paper sheets. |
| **Graphic Images** | With exception of dot matrix printer, impact printers cannot print graphics images. | Printing of graphical images in non-impact printers is very much possible. |
| **Character Style** | With exception of dot matrix, the character style cannot be changed in the impact printers. | It can print different types of characters form busing the individual printer. |

# CONCLUSION

1. Input and Output devices are indispensible components of a personal computer.
2. Act as a intermediary between the user and the machine in the process of communication.
3. Are the beginning and end of all processes, instructions executed in the machine.
4. without these devices, no operation can be effectuated.


Thank You!