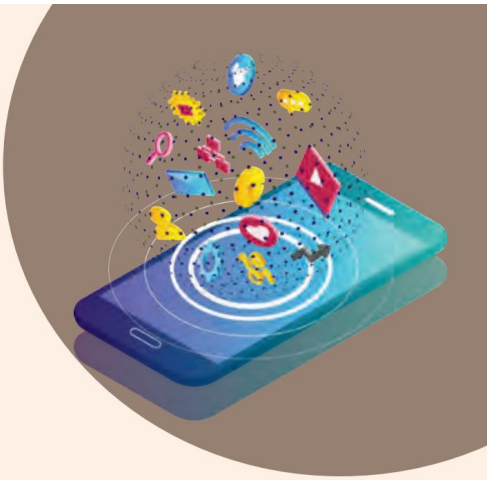

9

Peripheral Devices

In this chapter, we will dive into the complex world of computer hardware, where we explore the various components and peripherals that make up a computer system. Understanding these elements is crucial, as they form the backbone of computing technology, enabling us to perform an array of tasks from simple calculations to complex simulations.

Have you ever thought about how your computer detects key presses and mouse movements? Or how your printer turns digital files into printed pages? This all is possible with the help of the special devices that connect to your computer, known as peripherals.

Peripheral Devices

Peripheral devices are the tools that expand the capabilities of computing systems. They serve as connectors between the digital and physical worlds, facilitating interaction, communication, and the exchange of information.

A peripheral device, whether inside or outside the computer, is a tool that links directly to a computer or digital device but isn't directly involved in its main function, like processing data. It helps users access and utilise the computer's features. While the computer can work without these devices, some, like the mouse, keyboard, or monitor, are crucial for user-computer interaction. These devices are also known as input–output (I/O) devices.

Importance of Peripheral Devices

Peripheral devices significantly contribute to improving our overall interaction with computing systems and unlocking the full capabilities of our devices. Let's explore why these tools are not merely add-ons but rather integral parts of our technological resources.

1. **Enhanced Functionality:** They expand the capabilities of computers and other digital devices, allowing users to perform a wider range of tasks, from simple operations to complex activities.
2. **User Interaction:** Peripherals such as a keyboard, mouse, and touchscreen enable users to interact with and control the digital system efficiently, making the user experience more intuitive and effective.
3. **Data Input and Output:** Devices like printers and scanners enable the conversion of digital data into physical formats and physical formats into digital data, respectively, making it easier to share and store information in various forms.
4. **Connectivity:** Peripherals such as modems, routers, and network adapters facilitate communication and data transfer between devices, enabling access to the internet and other networks.

5. **Efficiency and Productivity:** With the help of peripherals like external storage devices, users can store and retrieve data quickly, enhancing overall efficiency and productivity in various tasks.
6. **Specialised Tasks:** Certain peripherals are designed for specialised functions, such as graphic tablets for digital art, microphones for audio recording, and webcams for video conferencing, catering to specific user needs and preferences.

Types of Peripheral Devices

Let's study the various categories of peripheral devices and explore the wide range of functionalities that they offer.

Input Devices

Input devices are electronic devices that receive instructions from the external environment and convert that data into a format that the computer can read and interpret. They act as a crucial link between the outside world and the computer, facilitating effective communication. When users input data using these devices, the information can be stored in the computer's memory for later processing and manipulation. An input device transmits data to a computer, enabling users to interact with and manage it.

Types of Input Devices

The following are the various types of input devices:

Keyboard

The keyboard is the primary input device for feeding data into a computer. It comprises different keys for typing letters, numbers, and symbols. A keyboard closely resembles a typical typewriter. It also includes some keys for performing specific functions. Keyboards come in various varieties. The standard keyboard has 104 keys. It connects to a computer system using either a USB cable or a Bluetooth connection.

Characteristics of the Keyboard:

1. The keyboard has different keys to perform different functions.
2. It allows the use of arrow keys as an alternative to the mouse.
3. The main keys of a keyboard are the alphabet keys, special character keys, cursor keys, numeric keypad, and function keys.

Mouse

The mouse is the primary pointing device. Clicking and dragging the mouse enables the movement of the mouse pointer across the computer screen. The left mouse button facilitates item selection or relocation, while the right mouse button displays supplementary menus upon clicking. Some of the mouse types are trackball mouse, mechanical mouse, optical mouse, wireless mouse, etc.

Characteristics of the Mouse:

1. The mouse controls the movement of the cursor on the screen, enabling users to navigate in the desired direction.
2. It permits users to select files, folders, or multiple items or texts.
3. Users can hover the mouse pointer over any object.
4. The mouse can open files, folders, etc. This involves positioning the pointer over the file or folder and subsequently double-clicking to open or execute it.

Joystick

A joystick is a device used to navigate the cursor or pointer on a screen. It consists of a spherical ball attached to both ends of the stick, with the lower ball housed in a socket. The joystick allows for movement in all directions. They offer greater precision and durability compared to a mouse.

Characteristics of the Joystick:

1. It is used to control the position of the cursor or pointer on a screen.
2. It is commonly used for playing video games.
3. It has special push buttons that are pressed to provide input to the computer.

Light Pen

A light pen is a device resembling a pen that is used for pointing. It enables drawing on the monitor screen or selecting menu items. It contains a photocell and an optical system within a small tube. The photocell sensor component identifies the screen's position and transmits a signal to the CPU when the light pen's tip is moved across the monitor screen while the pen button is pressed.

Characteristics of the Light Pen:

1. The light pen is useful for drawing graphics.
2. It is used to select objects on the display screen.

Scanner

The scanner captures images, text, or other physical content from a physical source and converts them into a digital format that can be stored and manipulated on the computer. There are different types of scanners, like flatbed scanners, handheld scanners, sheetfed scanners, drum scanners, etc. Most scanners today are variations of the desktop (or flatbed) scanner. A flatbed scanner functions in a manner somewhat similar to a photocopier, with the key distinction being that a photocopier produces a physical paper copy, whereas a scanner creates a digital image that is stored on a computer.

Characteristics of the Scanner:

1. Scanners can handle low-quality or non-standard-weight paper.
2. They are versatile, enabling the scanning of various items regardless of their size. Whether small items or large documents, they can be scanned if appropriately positioned.

Webcam

A webcam is a video camera that captures and streams video in real time over the internet or a computer network. Webcams are commonly used for video conferencing, live streaming, online video chat, and video surveillance. They are often built into laptops, tablets, and smartphones, while external webcams can be connected to computers via USB or other interfaces.

Characteristics of a Webcam:

1. **Image Quality:** Webcams vary in image resolution and quality, typically measured in terms of pixels, with higher resolutions providing clearer and more detailed images.
2. **Frame Rate:** The frame rate represents the number of frames the webcam can capture per second, with higher frame rates leading to smoother and more fluid video.
3. **Connectivity:** Webcams can connect to computers through various interfaces, such as USB, Wi-Fi, or Bluetooth.
4. **Additional Features:** Some webcams come with built-in microphones, autofocus, low-light correction, and pan-tilt-zoom (PTZ) capabilities (this allows the camera to move horizontally, vertically, and zoom in and out), allowing for enhanced video and audio performance.
5. **Compatibility:** Webcams can be compatible with various operating systems and video conferencing software, although some may have specific compatibility requirements.

Barcode Reader

A barcode reader is a device that interprets information represented by light and dark lines, known as a barcode. A barcode is frequently used for price and product identification, labelling objects, numbering books, etc. The barcode reader is used to scan and extract data from barcodes. By shining light beams on the lines of the barcode, the reader identifies the encoded data within the barcode.

Characteristics of the Barcode Reader:

1. You can scan the barcode by simply positioning the barcode reader near the code and scanning it.
2. Visual indicators provide users with confirmation that the card has been swiped accurately.
3. Upon inserting a card, automated barcode scanners initiate scanning immediately.

Output Devices

An output device is any hardware component that receives information from a computer and then presents it in various forms, such as audio, visual displays, or printed copies. These devices are responsible for translating computer data into a format that can be easily comprehended by humans. While input devices facilitate data entry into the computer, it is the output devices that showcase the results of computer operations to the user.

Types of Output Devices

Let's learn about the various output devices.

Monitor

The primary output device of a computer is a monitor, commonly referred to as a visual display unit (VDU), which exhibits processed data, including text, images, videos, and audio. It achieves this by arranging minuscule dots, known as pixels. The clarity of the display, also known as its resolution, depends upon the number of pixels present. Higher resolution means more pixels are packed into the display area, hence better quality.

There are two types of monitors:

1. **Cathode-Ray Tube (CRT):** This monitor relies on a cathode-ray tube, which generates a stream of electrons via electron guns. These electrons strike the inner surface of a phosphorescent screen, creating images. The CRT monitor comprises millions of phosphorescent dots in three primary colours: red, blue, and green. These dots illuminate upon impact, resulting in image formation. Its key components include the electron gun, fluorescent screen, glass envelope, deflection plate assembly, and base.
2. **Flat Panel Monitor:** This type of display, in contrast to CRTs, is lighter, thinner, consumes less power, and has a higher resolution. It can be portable or mounted on walls, finding applications in devices such as calculators, video games, laptops, and graphical displays.

Did You Know?

Additionally, there is the plasma monitor, which is also a form of flat panel display. This technology utilises plasma cells positioned between two glass surfaces, containing noble gases and mercury solutions. When electricity is supplied, the gas transforms into plasma, generating UV light that produces an image.

Characteristics of the Monitor:

1. **Resolution Pixels:** Pixels are the smallest element of any image. The higher the number of pixels, the better the resolution of a monitor.
2. **Size:** The size of the monitor is the diagonal measurement of a desktop screen, which is typically 14 to 25 inches.
3. **Refresh Rate:** Total number of times per second that an image on a display is repainted or refreshed. The higher the refresh rate the better the display of the monitor.
4. **Luminance:** It is the brightness of the screen.

Printer

Printers are the output devices that produce a physical copy of a digital document or image. Printers are one of the most popular computer peripherals to print text and photos.

They are broadly classified into two categories:

1. **Impact Printers:** These types of printers employ a print head or hammer to transfer data onto the paper. The print head or hammer strikes an ink ribbon against the paper, resulting in the printing of characters. Some of the types of impact printers are:
   - Dot matrix printer
   - Daisy wheel printer
   - Line printer
   - Chain printer

2. **Non-impact Printers:** Non-impact printers are distinct in that they do not require a ribbon to print characters. These printers are frequently referred to as page printers due to their ability to print an entire page at once. Some of the types of non-impact printers are:
   - Laser printers
   - Inkjet printers

Characteristics of the Printer:

1. **Print Quality:** Printers vary in their ability to produce high-resolution text and images.
2. **Printing Speed:** The speed at which a printer can produce printed output varies, with some printers capable of high-speed printing for large volumes. The speed of a printer is measured in **pages per minute (ppm)**.
3. **Connectivity and Compatibility:** Printers may offer various connectivity options, such as USB, Wi-Fi, or Bluetooth, and compatibility with different operating systems and devices.

Plotter

A plotter is an advanced device used for producing high-resolution graphics in various colour formats. While similar to a printer in some aspects, it offers more sophisticated capabilities. Its primary applications include printing large-scale maps, architectural designs, and oversized graphics. Additionally, it is employed for creating images, 3D renderings, advertising materials, and detailed schematics of internal machine structures.

Characteristics of the Plotter:

1. Large-size prints can be taken via plotters.
2. It is slow and expensive.

Projector

A projector is a device that enables individuals to display their computer or device output on a wall or screen. Through the use of light and lenses, it enlarges and projects text, images, and videos. Consequently, it serves as a valuable output device for delivering presentations or projecting movies.

Characteristics of a Projector:

1. They are portable and can be effortlessly connected and used to project an image on a wall by a single individual.
2. Projectors represent a highly economical solution for creating a large video display within the home.
3. Projectors are compact and can be easily mounted on a back shelf, bookcase, or ceiling, as they occupy no floor space.

Speaker

Speakers are essential peripherals linked to computers for audio output. To facilitate their function, sound cards are necessary. Available in diverse configurations, from basic two-speaker setups to more elaborate surround-sound systems with multiple channels, speakers come in various sizes and designs. They receive audio input from the computer's sound card and translate it into audible sound waves.

Characteristics of Speaker:

1. Speakers are available in a wide range of qualities and prices.
2. Nowadays most computer systems include speakers in the CPU cabinets.

Microphone

A microphone is an audio input device that lets you talk or record sounds on your computer. Using a microphone, often called a mic, you can chat with friends, record your voice, or even control your computer using voice commands.

Characteristics of a Microphone:

1. A microphone can capture sounds from the surroundings very clearly.
2. It is easy to use by simply plugging it into your computer.
3. The microphones can be used for a variety of tasks such as online meetings, chatting with friends, voice recording, and giving voice commands.
4. Microphones used with computers are available in small sizes, making them convenient for desktop or laptop use.

Did You Know?

Most laptops these days are equipped with microphones, by default. With desktop computers, you can use either a pair of microphones or a headset that is a combination of microphones and speakers.

Storage Devices

Storage devices are integral components in which a computer retains all its data, including files, programs, operating system, etc. These devices are like virtual shelves, enabling the systematic organisation and retrieval of digital assets. Without storage devices, the computer would be unable to retain files, programs, or even its fundamental instructions. Storage devices safeguard and facilitate access to your data whenever required.

Types of Storage Devices

Let us learn about some commonly used storage devices.

Hard Disk Drive (HDD)

A Hard Disk Drive (HDD) comprises a rotating disk (platter) coated with a magnetic substance and a read/write head that records and retrieves data on the disk's surface. The read/write head moves across the spinning disk to access different sections of the stored data. HDDs are commonly used to backup data.

Characteristics of a Hard Disk Drive (HDD):

1. **Ample storage capacity:** HDDs provide substantial storage space, with certain models capable of accommodating up to 16TB of data.
2. **Cost-effectiveness:** HDDs offer a budget-friendly solution for storing extensive volumes of data.
3. **Larger physical dimensions**: Although HDDs are often installed inside the CPU cabinets, nowadays external hard disks are also available. These can easily be carried from one place to another.
4. **Slower operational speed**: HDDs exhibit slower data access and transfer speeds in comparison with primary memory.
5. **Mechanical components:** HDDs include mechanical elements that can deteriorate over time.

Solid State Drive (SSD)

Solid State Drives (SSDs) utilise flash memory for data storage rather than a spinning disk. SSDs have significantly faster speeds, enhanced durability, and reduced vulnerability to mechanical breakdowns compared to HDDs.

Characteristics of a Solid-state Drive (SSD):

1. **Faster performance:** SSDs deliver notably faster data access and transfer speeds in comparison to HDDs.
2. **Compact form:** With smaller and lighter physical dimensions, SSDs are well-suited for integration into portable devices like laptops and tablets.
3. **Lower power consumption:** SSDs consume less energy than HDDs, thereby promoting greater energy efficiency.
4. **Higher price point:** SSDs are more costly than HDDs.
5. **Absence of mechanical components:** SSDs lack moving parts, resulting in increased durability and decreased susceptibility to mechanical failure compared to HDDs.

Flash Drive

A flash drive, also known as a pen drive, is a portable storage device that utilises flash memory to store and transfer data. It is typically small in size and connects to a computer via a USB (Universal Serial Bus) port, allowing for easy data transfer between devices. Flash drives are commonly used for backing up data.

Characteristics of Flash Drives:

1. **Portability:** Flash drives are compact and lightweight, making them highly portable and convenient for on-the-go use.
2. **Plug-and-Play:** They can easily be connected to a computer's USB port without the need for additional software installation, enabling quick data access and transfer.
3. **High Compatibility:** Flash drives are compatible with various operating systems and devices, allowing for seamless data exchange between different platforms.
4. **Data Storage:** They offer varying storage capacities, ranging from a few gigabytes to several terabytes, providing ample space for storing and transferring different types of files.
5. **Reusability:** Flash drives can be erased and rewritten multiple times, allowing for the easy removal and updating of data as needed.

Communication Devices

Communication devices are instrumental in enabling the transmission of data and information between your computer and external networks, devices, or the internet. Their functionality empowers your computer to engage in data sharing, access resources, and establish connections with the global digital network. Whether it involves internet connectivity, video conferencing for collaborative purposes, or the smooth transfer of files, these devices are essential for enhancing the communication and interactive capabilities of your computer.

Types of Communication Devices

Let us learn about some commonly used communication devices.

Modem

A modem, short for modulator-demodulator, is a hardware device that allows a computer or other devices to connect to the internet. It modulates digital data into an analog signal that can be transmitted over telephone lines, cable lines, or fibre optics, and then demodulates the incoming analog signal back into digital data. There

are several types of modems, including dial-up modems, DSL modems, cable modems, and fibre modems, each of which has its own specifications and capabilities.

Characteristics of the Modem:

The following are the characteristics of a modem:

1. **Connection Type:** Modems can connect through various mediums, including telephone lines (dial-up), coaxial cables (cable modems), DSL lines (DSL modems), or fibre optics (fibre modems).
2. **Speed:** Modems have different data transmission speeds, typically measured in bits per second (bps) or megabits per second (Mbps).
3. **Functionality:** Some modems may also include additional features such as built-in Wi-Fi routers, multiple ethernet ports, or advanced security features.

Router

A router is a device that helps different types of computer networks to communicate with each other. A modem connects a computer to the internet, whereas a router connects two computer networks to each other as well as the internet. The main functionality of a router is to make sure that the information reaches its intended destination while keeping data safe along the way.

Characteristics of a Router:

1. **Directing Traffic:** Routers find the best way for information to travel from one computer to another on a network.
2. **Security Features:** Routers can implement security features such as firewalls to protect the computer networks from any unwanted traffic.
3. **Wi-Fi:** Some routers let you connect to the internet without using cables, which is called Wi-Fi (Wireless-Fidelity).
4. **Updates:** Routers can be updated to get new features or fix problems.

Activity Time

Activity 1: Group Discussion *(Group work)*

Create groups of 4–5 students and ask them to discuss various input and output devices that they use in their daily tasks.

Activity 2: Research Work *(Individual work)*

Visit your nearby stores, such as a grocery shop, medical store, and a restaurant. Identify and list the peripheral devices that are used at these places. Compare your list with your classmates' and discuss.

Activity 3: Create a Collage *(Individual work)*

Collect the pictures of various peripheral devices from the old newspapers, books, or magazines. Create a collage by pasting these pictures on chart paper. Paste the collage in your classroom or computer lab.

Chapter Checkup

A **Select the correct option.**

1. Which of the following is a type of printer that does not require a ribbon to print characters?
   - a. Dot matrix printer
   - b. Line printer
   - c. Laser printer
   - d. Daisy wheel printer

2 What is the primary function of a modem?

a To print documents
b To project images
c To connect to the internet
d To scan barcodes

3 Which of the following is a characteristic of a flash drive?

a Large size and heavyweight
b Incompatibility with various operating systems
c Slow data transfer rate
d Portability and plug-and-play functionality

B Fill in the blanks with the most suitable words.

1 ..... is a device that enables individuals to display their computer or device output on a wall or screen.

2 ..... devices receive information or instructions from the external environment and convert that data into a format that the computer can read and interpret.

3 ..... devices are instrumental in enabling the transmission of data between your computer and external networks, devices, or the internet.

C State whether the following is *True* or *False*. Correct the statements that are false.

1 A light pen is used primarily for drawing graphics and selecting objects on the display screen.

2 Solid-state drives (SSDs) are generally more affordable than hard disk drives (HDDs).

3 The monitor is the primary output device of a computer, displaying processed data including text, images, and audio.

D Answer the following questions. *(Solved)*

Q1. What are the main differences between a solid-state drive (SSD) and a hard disk drive (HDD)?

A1. The main differences between a solid-state drive (SSD) and a hard disk drive (HDD) are:

- **Memory:** SSDs use flash memory, while HDDs have spinning disks.
- **Speed:** SSDs are faster.
- **Durability:** SSDs have no moving parts, making them more durable.
- **Power consumption:** SSDs consume less power.
- **Cost:** SSDs are generally more expensive than HDDs.

Q2. How do input devices facilitate effective communication between the external environment and the computer? Provide examples of commonly used input devices.

A2. Input devices facilitate effective communication by receiving information or instructions from the external environment and converting that data into a format that the computer can read and interpret. Examples of commonly used input devices include the keyboard, mouse, scanner, and barcode reader.

Q3. In Samita's class, the teacher is using the projector to display a presentation on peripheral devices. Explain some characteristics of projectors.

A3. The following are the characteristics of projectors:

- They are portable and can be effortlessly connected and used to project an image on a wall by a single individual.
- Projectors represent a highly economical solution for creating a large video display within the home.
- Projectors are compact and can be easily mounted on a back shelf, bookcase, or ceiling, as they occupy no floor space.

Answer Key

A **1.** c **2.** c **3.** d

B **1.** Projector **2.** Input **3.** Communication

C **1.** True.

2. False. SSDs are generally more expensive than HDDs.

3. True.