SECTION 2
INPUT AND OUTPUT DEVICES

This Section you will learn about:
Input Devices:
  the uses of each device
  the advantages of each device
  the disadvantages of each device
Output Devices:
  the uses of each device
  the advantages of each device
  the disadvantages of each device
Control Applications and the Uses of each device

An input device is any hardware device that sends data to the computer, without any input devices, a computer would only be a display device and not allow users to interact with it, much like a TV.

Input devices convert the user's actions and analog data (sound, graphics, pictures) into digital electronic signals that can be processed by a computer. Digital data (such as from barcode readers, modems, scanners, etc.) does not require any conversion and is input direct into a computer. It is through input devices that a user exercises control over a computer, its operations, and outputs.
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Keyboard

Keyboard is the very popular input device. The keyboard helps in inputting the data to the computer. The layout of the keyboard is like that of traditional typewriter, although there are some additional keys provided for performing some additional functions.

Most of the keyboard use the QWERTY layout (this name comes from the keys on the top row, which spell out ‘QWERTY’).

Ergonomic keyboards have also been developed recently. These are designed to reduce health-related problems associated with the standard keyboard (e.g. carpal tunnel syndrome or repetitive strain injury (RSI))

Keyboard are of two sizes 84 keys or 101/102 keys, but now 104 keys or 108 keys keyboard is also available for Windows and Internet.

The keys are following

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Keys</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Typing Keys</td>
<td>These keys include the letter keys (A-Z) and digits keys (0-9) which are generally give same layout as that of typewriters.</td>
</tr>
<tr>
<td>2</td>
<td>Numeric Keypad</td>
<td>It is used to enter numeric data or cursor movement. Generally, it consists of a set of 17 keys that are laid out in the same configuration used by most adding machine and calculators.</td>
</tr>
<tr>
<td>3</td>
<td>Function Keys</td>
<td>The twelve functions keys are present on the keyboard. These are arranged in a row along the top of the keyboard. Each function key has unique meaning and is used for some specific purpose.</td>
</tr>
<tr>
<td>4</td>
<td>Control keys</td>
<td>These keys provides cursor and screen control. It includes four directional arrow key. Control keys also include Home, End, Insert, Delete, Page Up, Page Down, Control(Ctrl), Alternate(Alt), Escape(Esc).</td>
</tr>
<tr>
<td>5</td>
<td>Special Purpose Keys</td>
<td>Keyboard also contains some special purpose keys such as Enter, Shift, Caps Lock, Num Lock, Space bar, Tab, and Print Screen.</td>
</tr>
</tbody>
</table>
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Uses
- Keyboards are used to input data into applications software (e.g. text into word processors, numbers into spreadsheets, etc.).
- They are also used for typing in commands to the computer (e.g. Prnt Scrn, Ctrl+P to print out, etc).

Advantages
- Keyboards enable fast entry of new text into a document.
- Keyboards remain the most common method of inputting text-based data. Most people find them easy to use.
- It is easy to do verification checks as data is entered, as it appears on the screen simultaneously.

Disadvantages
- Users with limited arm/wrist use can find keyboards hard to use.
- Entering data using a keyboard is slow when compared to direct data entry (e.g. optical mark recognition).
- Keyboards are fairly large devices that use up valuable desk space.

Concept Keyboard
A concept keyboard is a specialised keyboard with no pre-set keys. It relies on a touch sensitive screen with the key or overlay displayed on the screen. Each key can be programmed with a wide range of different functions. The overlay is often used as a quick and easy way to input items without needing to type anything or use a mouse.

Use
- Games for young children: The overlay image could be a picture of a farmyard. Pressing on an animal would cause the computer to make the noise the animal does.
- Tills in restaurants/pubs: The overlay contains a list of all the meals that can be sold. Instead of typing in prices the waiter simply presses the keyboard where the meals/drinks he is serving are listed.

Advantages
- Much faster for making non-text selections such as menu choices on the till of a fast-food outlet.
- The keyboard is waterproof which can be useful where there is dirt or the risk of splashes.

Disadvantages
- Poor for text or numeric input - although some keyboards do include a numeric keypad so the operator can enter the amount sold.
- Limited to the options shown on the keyboard.
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Numeric keypads
A numeric keypad is used to enter numbers only (although some have a function key to allow input of alphabetic characters).

Uses
- Numeric keypads are used in automatic teller machines (ATMs), where customers can key in their personal identification number (PIN), an amount of money, etc.
- Telephones have numeric keypads to allow phone numbers, etc. to be keyed in.
- Electronic point of sale (EPOS) terminals have numeric keypads in case the barcode reader fails to read the barcode and the number has to be keyed in manually by the operator.
- Chip and PIN devices have numeric keypads for entry of PIN, amount of money, etc.
- They are used to enable fast entry of numeric data into a spreadsheet.

Advantages
- Numeric keypads are faster than standard keyboards for entry of numeric data.
- Since many are small devices (e.g. mobile phones), they are very easy to carry around.

Disadvantages
- They can be difficult to use, due to very small keys.
- It is difficult to use them for entering text.
- Sometimes the order of the numbers on the keypad isn't intuitive.

MOUSE

A mouse is the most common pointing device. You move the mouse around on a mat and a small cursor called a pointer follows your movements on the computer screen. By pressing a button on the mouse (most mice have 1, 2 or 3 buttons) you can select options using icons or menus on the screen. Mice can also be used to "draw" onto the screen. They are particularly useful if your computer has a graphical user interface.

Most mice use a small ball located underneath them to calculate the direction that you are moving the mouse in. As you move the mouse this ball rotates. The mouse monitors how far the ball turns and in what direction and sends this information to the computer to move the pointer.

Uses
- For the user to communicate with a graphical user interface
- To select icons and, through them, activate commands
- To issue commands to the computer directly (e.g. 'scroll down')
- To allow the user to select from a range of menu items and activate specified commands.
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Advantages
- It can be faster to select an option using a mouse rather than a keyboard.
- Mouse enable rapid navigation through applications and the internet.
- Mouse are small and so take up little area.

Disadvantages
- People with restricted hand/wrist movement can find it hard to operate a mouse.
- Mice are easily damaged and the older type of mouse also quickly becomes clogged up with dirt.
- They are difficult to use if there is no flat surface readily available
- Hand-to-eye coordination is an issue for some users.

TOUCHPAD

A touchpad is a pointing device featuring a tactile sensor, a specialized surface that can translate the motion and position of a user's fingers to a relative position on screen. Touchpads are a common feature of laptop computers, and are also used as a substitute for a mouse where desk space is scarce. Because they vary in size, they can also be found on personal digital assistants (PDAs) and some portable media players.

Use
- Touchpad are used in laptops, Netbook, PDA

Advantages
- It can be faster to select an option using a touchpad rather than a keyboard.
- Touchpads enable rapid navigation through applications and the internet.
- Since the touchpad is integrated into the laptop computer, there is no need for a separate mouse, aiding portability.
- They can be used even when there are no flat surfaces available.

Disadvantages
- People with limited hand/wrist movement find touchpads difficult to use.
- It can be more difficult to control the pointer when compared with a mouse.
- They are more difficult to use when doing certain operations such as ‘drag and drop’.

Tracker Ball

A tracker ball (or trackball) is an alternative to a mouse. It works in the same way as a mouse except that the ball is on top. Turning the ball with your hand moves the pointer on the screen. Tracker balls are used mainly when there is not enough space for a mouse. e.g. in portable computers.
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Uses
- For use by people with limited motor skills e.g. young children or people with disabilities
- They are used in applications where the user has a disability (such as RSI).
- They are used in a control room environment, where it is faster than a mouse to navigate through process screens and is more robust than a mouse.

Advantages
- Trackerballs do not need the same fine control as a mouse.
- People with limited hand/wrist movement find it easier to use than a mouse.
- The pointer can be positioned more accurately on the screen than with a mouse.
- They take up less desk space than mice since they are stationary.

Disadvantages
- Trackerballs are not supplied with the computer as standard, so they are more expensive.
- User may need training since they are not standard equipment.

Remote Control

A remote control is a component of an electronics device, most commonly a television set, DVD player and home theater systems originally used for operating the device wirelessly from a short line-of-sight distance using Infra Red Light. The buttons on the keypad are used to select options.

Uses
- Using remote control devices to operate TVs, video players/recorders, DVD players/recorders, satellite receivers, HiFi music systems, data or multimedia projectors.
- They are used in industrial applications to remotely control processes, stop and start machinery, etc.

Advantages
- Remote controls enable devices to be operated from any distance, which is particularly useful for people with disabilities.
- Some chemical processes are hazardous, so it is safer to operate equipment from a distance.

Disadvantages
- People with limited hand/wrist movement can find them hard to use.
- The signal between the control and the device can be easily blocked.
Joystick

Joystick is also a pointing device which is used to move cursor position on a monitor screen. It is a stick having a spherical ball at its both lower and upper ends. The lower spherical ball moves in a socket. The joystick can be moved in all four directions.

**Uses**
- Used by a pilot to fly an aeroplane or flight simulator.
- Used in car driving simulators and for playing games

**Advantages**
- It is easier to navigate round a screen using a joystick rather than a keyboard.
- Control is in three dimensions.

**Disadvantages**
- It is more difficult to control the on-screen pointer with a joystick than with other devices, such as a mouse.

Touch Screen

Touch-sensitive display device with which users interact by touching areas of the screen. Values are associated with different positions on a VDU via a 'grid' of infrared beams across the front of the screen. When the user touches a particular part of the screen, the associated value is sent to be processed.

**Uses**
- The main applications for which touch screens are used is the provision of public information systems. Touch screen operated computers can be found in places such as travel agents and airports.
- Touch screens are used by museums and galleries to communicate information.
- They can also be used by small children and people whose disabilities might prevent them from using other input devices.
- They are increasingly common in places where customers place orders, e.g. Fast food outlets.
- Personal digital assistants (PDAs), mobile phones and satellite navigation systems use touch screens.

**Advantages**
- They are user-friendly. Even people who might be intimidated by computers feel comfortable using these devices.
- It is a user friendly method for inputting data, so no training is necessary.
- Touch screens are tamper proof, preventing people from keying in information which could potentially corrupt the computer system.
Disadvantages

- There is a limited number of options available.
- Using touch screens frequently can lead to health problems (e.g. straining of arm muscles, RSI, etc.).
- The screen can get very dirty with constant touching.

Magnetic stripe readers

These are used to read information from the magnetic stripe found at the back of magnetic stripe cards, for example, on the back of a credit card. The stripe contains useful information, such as the account number, sort code, expiry date and start date. A magnetic strip – usually placed on a plastic card – contains encoded data about the card's user. When the card is swiped through a sensitive reader it is translated into data which can be processed by a computer.

Uses

- Magnetic stripe readers are most often used in POS terminals, ATMs and in security applications.
- Travel systems (e.g. train and underground tickets) use magnetic stripes

Advantages

- Data entry is faster compared with keying in using a keyboard or keypad.
- The information held on the magnetic stripe is secure: because it cannot be read directly by a person; and, since there is no typing, there is not the risk of somebody observing your key strokes
- They can prevent access to restricted/secure areas.

Disadvantages

- The card needs to be in close contact with the reader, so magnetic stripe readers don’t work at a distance.
- Since the information is not human readable, this can be a disadvantage in some applications (e.g. hotel room numbers are not printed on the card, so there needs to be another way of showing the information for the customer).

Chip readers

Smart cards contain chips and are similar to magnetic stripe cards. With these cards the information is stored on the chip (e.g. PIN and personal data). The data stored on the chip can be updated. A device used to read data on the thin microprocessor embedded in ATM or credit cards is called Chip Reader.
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Uses
- Chip readers are used in ATMs to obtain cash and in retail stores for bill payments.
- They are used to update the smart card such as loyalty card or travel cards.

Scanner

A scanner is a light sending input device that reads printed text and graphics then sends the results into a form a computer can process. It reads the text or picture and transform into a computer file mostly picture file which can be edited using image processing software.

There are two types of Scanner

**Flatbed Scanner** : You place the image on top of the scanner. The scanner moves the light and sensor itself and scans the whole image automatically. Most flatbed scanners are A4 size. Flatbed scanners are better as they can scan larger images and are more accurate than handheld scanners.

**Handheld Scanner** : You must manually push the light/sensor along the image. Handheld scanners are usually 5 inches wide. Handheld scanners are cheaper and more portable.

Uses
- Scanners are used to scan in documents and convert them into a format for use in various software packages.
- Old and valuable documents and books can be scanned, thus protecting the Originals from damage through handling and also producing records in case the paper copies are lost or destroyed.

Advantages
- Images can be stored for editing at a later date (paper documents cannot be edited unless they are scanned first).
- Scanners are much faster and more accurate (i.e. no typing errors) than typing in documents again.
- It is possible to recover damaged documents and photographs by scanning them and then using appropriate software to produce an acceptable copy.

Disadvantages
- The quality can be limited, depending on how good the scanner resolution is.