PHARO SECONDARY SCHOOL

ICT DEPARTMENT

~ **TR. OLIVER**

DIGITAL DEVICES

Digital devices are pieces of hardware that use computers or microcontrollers, and they are found everywhere in our digital world.

They enhance and support how we live our lives every day.

They can connect and work together to give us the data we need, when and where we need it.

Digital devices are always developing. This changes the way in which they are used by individuals, organizations and local, national and global societies.

TYPES OF DIGITAL DEVICES

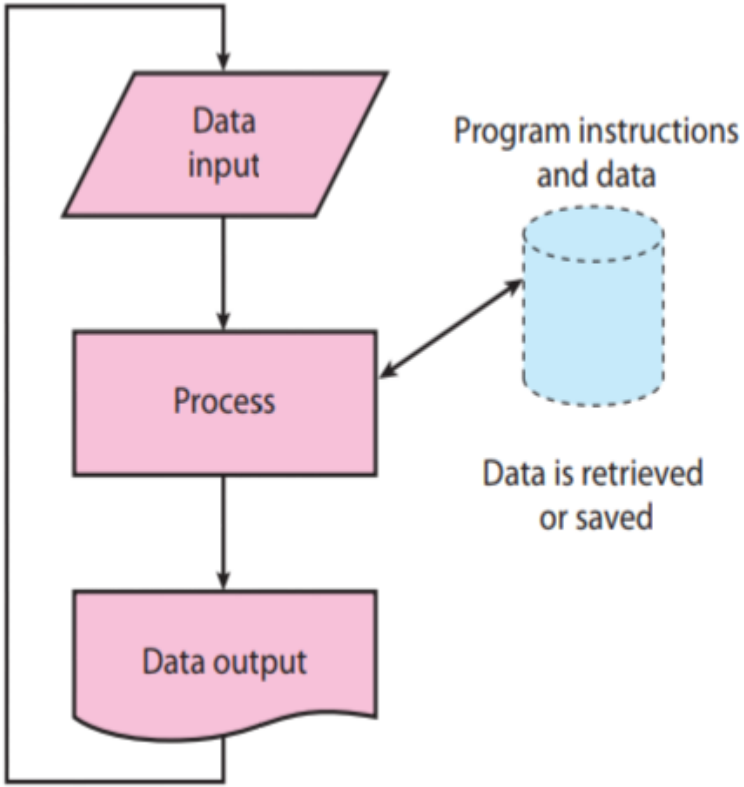
- **Computers**
- **Mobile phones**
- **Tablets**
- **Cameras and camcorders**
- **Home entertainment systems**
- **Navigation aids**
- **Home automation devices and smart assistants**

What is a computer?

- A computer is an electronic machine that **inputs data**, **processes** it under the control of a stored program, and **outputs information**.
- While the data is being processed, data can be retrieved from or saved on backing **storage**
- **Data** is raw, unprocessed information. Information is data that people understand. In order to understand data, you may have to interpret it:
- The number 30112012 is data that can be interpreted as:
  - A date 30/11/2012
  - A sum of money $301,120.12
- The interpreted data, that is the date or the sum of money, is the

Computer model

- **Input** – data is entered into the computer.
- **Process** (turn data into information) - computer is controlled by a program, that is, a sequence of instructions. It processes the input data automatically following these instructions.
- **Store** – the program and data are stored, e.g. on a hard disk, for later retrieval.
- **Output** – the computer communicates to the user, e.g. it displays graphics on the screen.



Types of computer

Computers can be:

- **PCs (personal computers)** – a microcomputer for individual use.
- **Mainframe computers** – large computer, with huge processing power.
- **Minicomputers** – smaller version of a mainframe.
- **Supercomputers** – very large mainframe.

N/B: Mainframe is a large, powerful computer that can do a lot of complicated jobs quickly and can be used by a lot of people at the same time.

Different types of PC

- **Desktop** – has these basic components: monitor, keyboard, system unit and mouse
- Some desktops are "all-in-one" meaning they combine the monitor with pc hardware.

- **Laptop** – a portable computer slightly larger than A4 size.
- Some laptops are desktop replacements (they are bigger than other laptops and have a better screen resolution and performance than other laptops

Embedded computers

An embedded computer is designed for and built into a specific application where it will perform a limited range of dedicated functions. The size and functionality of an embedded computer depends on the application. They may be very small devices built into a single microchip and may control the device.

Hand-held computer

A handheld computer or Personal Digital Assistant (PDA) or palmtop can fit in one hand or in your pocket, but it is too small for general work. A PDA usually has a touch sensitive screen. Although PDAs can be temporarily attached to a Keyboard, you cannot comfortably type a long document into a PDA.

Mobile phones

- Mobile phones use SIM (subscribers identity module) to connect to mobile phone networks
- **Specialists phone** have special features to provide users with functions that meet particular user needs

Smartphone

- Smartphones are small computers with Wi-Fi and mobile phone connectivity to allow them to make phone calls and access the internet.
- They also include features of other devices such as cameras, media players and hand-held games consoles.
- They have a more advanced operating system than other mobile phones.
- Applications (or apps) can be downloaded onto the smartphone, which allow users to customise their smartphones with entertainment, educational and business features.
- Most smartphones use a touch screen to allow users to input information. A virtual keyboard is used to enter text, numbers and other characters.
- Because they combine so many features, smartphones use more power than other types of mobile phone. This means that they have a shorter battery life and need to be charged more regularly than other mobile phones.

Tablets

- Tablet devices or tablets are bigger than smartphones, but have similar features. For example, a tablet device has a touch screen, apps and Wi-FI Connectivity to provide access to the internet.

- Some tablet devices have SIM card slots to allow internet connectivity using the moble phone network, so that they can be online when they are not within range of a Wi-Fi signal.

CAMERAS AND CAMCORDERS

- Digital cameras and camcordars use light sensors to capture images formed by light passing through the device's lens.
- Traditionally, cameras are used to capture still images and camcorders are used to capture moving images.
- However, most digital cameras can now film moving images and most camcorders can photograph still images.

Home entertainment systems

They include :

- ❑ Televisions
- ❑ Sound systems
- ❑ Personal video recorder
- ❑ Blu-ray and DVD player
- ❑ Game consoles
- ❑ Media players

Televisions

- Televisions display still and moving images on a screen.
- The quality of the image is set by the number of pixels that are used to display the image. This is referred to as the screen's resolution.
- resolution is the number of pixels used by a screen to display an image
- Pixels are small dots that helps to make up an image

SOUND SYSTEMS

Sound systems can produce loud, rich sound using high-quality speakers and amplifier. Some speakers contain built-in ampifiers

MEDIA PLAYERS

They are electronic devices that can store and play digital music and videos and show digital photographs

PERSONAL VIDEO RECORDERS

A personal video recorder (PVR) is a device that records broadcasted content so that it can be watched at a later date.

BLU-RAY AND DVD PLAYERS

Blu-ray and DVD players connect to televisions in order to play films and other content that is stored on DVD or Blu-ray disks.

▲ Figure 1.15 A Blu-ray player

GAMES CONSOLES

Games consoles are designed to enable users to play video games on a television screen. Games are provided on disks or as downloads from the intenet. They use controllers, which are often wireless, to control the characters, vehicles and/or objects in the game.

Some consoles use motion sensors to allow the player to control the game with gestures and body movements.

Other games use virtual reaity controllers and headsets to immerse the player in a realistic gaming experience, where their own movements in the real world are replicated by an avatar in the virtual world of the game.

NAVIGATION AIDS

Navigation aids (such as Sat-Nav) can calculate the best route between two or more locations and can provide updates to the route if it is not followed accurately. They are commonly used in caravans , delivery vans and ships.

They provide visual prompt and alerts to help drivers take the correct route, such as by taking a particular turning. Specialist devices with audio alerts and waterproof and shockproof cases are availabie for walkers, cyclists and runners.

- GPS is the Global Positioning System that uses radio signals from satellites to show your exact position on the Earth on a special piece of equipment
- Navigation aids use information from GPS satelites to determine the exact location of the device on Earth.
- Navigation aids also use orientation sensors to know which way the device is curently pointing, and the device will display the user's position and orientation on a map. Maps are either stored permanenty on the device or downloaded from the internet when they are needed.
- GPS does not need Internet connectivity in order to work. However, navigation aids need internet conmectivity in order to update map data.

HOME AUTOMATION DEVICES AND SMART ASSISTANTS

One type of emerging technology is a group of devices that can be used to create smart homes. For example home automation devices can connect a range of digital devices which sense and control functions in the home, such as temperature and lighting. These functions can be controlled from apps on smartphones or the internet.

FEATURES OF DIGITAL DEVICES

- They include:
    - Portability
    - Performance
    - User interface
    - Security features
    - Energy consumption
    - Expansion capabilities
    - Connectivity
    - Media support
    - Storage

PORTABILITY

- Portability is the ability of a device to be easily carried or moved around.
- For a device to be portable, it needs to be easy to carry and move around.
- This means that the portablity of a device is directly related to its size and weight.
- For some devices, such as a television or a desktop computer, portability is unlikely to be a priority.

STORAGE

- Files and programs are stored in storage.
- More available storage allows users to store more files and programs.
- Storage speed also affects performance

CONNECTIVITY

- Devices can share data by connecting to each other using wired or wireless connectivity.
- Connectivity can be used to update software. back up files or play media from one device on another.
- Different connectivity types provide different speeds of data transfer and levels of convenience.
- Wired connectivity is usually faster and more reliable, but introduces additional cost, mess, inconvenience and safety risks such as tripping especially for young children.

MEDIA SUPPORT

- Different devices can read data from and write data to different types of media.
- Examples of media include SD and microSD flash memory cards, and DVD.
- If devices do not have built-in (native) media, adapters can usually be connected to provide connectivity to an external device into which the media can be inserted.

EXPANSION CAPABILITY

- Some PCs allow users to install additional components.
- Some smartphones and tablet devices have expansion slots to allow them to make use of flash memory cards.
- Systems can also be expanded using ports such as USB ports. These allow the user to connect axtra devices called peripheral

ENERGY CONSUMPTION

- Digital devices require electricity to work. One benefit of lower energy consumption in mobile devices is a longer battery life.
- Due to the rising cost of energy and pressure from customers and governments to be more environmentally responsible, manufacturers are creating digital devices that consume less energy.

PERFORMANCE

- A high-performance device performs its job or tasks quickly.
- The speed at which a device performs is determined by the speed at which it can carry out instructions from its software.
- Software instructions are carried out by the processor, which means that a faster processor will increase the performance of the device.

- RAM (Random Access Memory), which is the memory in a computer system that is used for running software Instructions are loaded into the processor from RAM, which means that faster RAM wil also allow instructions to be loaded into the processor more quickly.
- RAM holds all software instructions to be carried out, so more RAM will allow the system to have more programs running at the same time.

SECURITY FEATURES

- The data stored on digtal devices may be private, valuable or both.
- This means that devices need to have security features to keep their users' data safe.

a) SOFTWARE SECURITY

- They prevent unauthorised access to data.
- digital devices have a range of software security features to ensure that the person trying to use the data is authorised.
- Examples of software security features are use of:
  - passwords,
  - PIN (personal identification numbers) and
  - biometric systems.

b) PHYSICAL SECURITY

- Physical security to prevent theft is also important.
- Many devices use security slots which can have locks attached to secure them to furniture.
- Some attach to specialist slots. Others connect to a port on the device with spacial screws used to secure the locks in place.

USER INTERFACE

- User interface is the device's ability to interact with a user
- Users give commands to a device through the user interface. There are several different types of user interface including :
    - ❑ Command line
    - ❑ Graphical user interface
    - ❑ Menu-driven
    - ❑ Voice interface
    - ❑ Gesture interface

COMMAND LINE INTERFACE (CLI)

When using a command line interface, users enter text instructions and the computer system provides results or feedback as text.

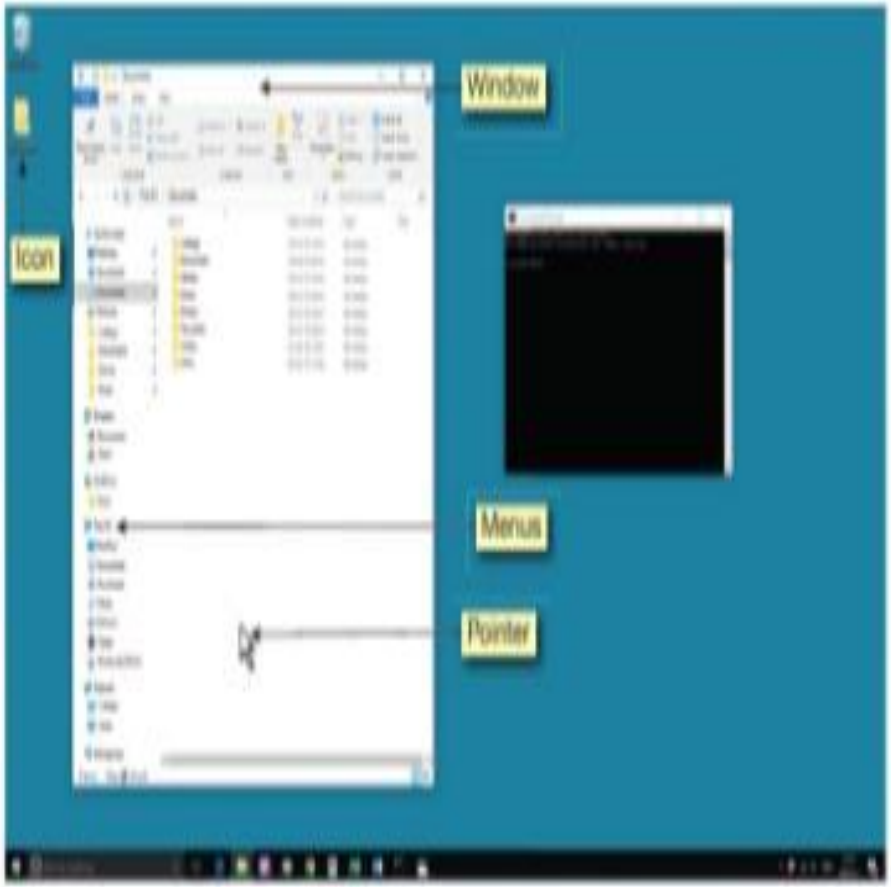
MENU-DRIVEN INTERFACE

- This type of interface displays a list of options as a menu.
- Selecting one of these options will either trigger a command or display another menu with further options to choose from.
- Menu-driven interfaces are easier to use than command line interfaces, but can take more time as you have to go through the menu structure each time you want to carry out a command, rather than typing the command directly into the system.
- This type of interface is used in many devices including ATMS (cash machines in banking), televisions and older mobile phones.

GRAPHICAL USER INTERFACE (GUI)

- A graphical user interface is controlled by a pointer on the screen and uses a screen made up of windows, icons and menus.
- **Windows** are areas of the screen that are dedicated to applications or operating system tasks
- **Icons** are small images that represent an application. They can be selected with the pointer to open the application.

- **Menus** provide options for tasks relating to the operating system or open applications.
- This is the easiest type of interface to use, but it takes up more memory and storage than a command line or menu-driven interface.



VOICE INTERFACE

- A voice interface allows the user to give spoken commands to a device.
- The device has voice recognition software which matches the spoken words against a library of words to find a match. To save storage on the device, the library of words is often stored online, so these devices usually require intemet access.
- The disadvantage of using a voice interface is that sometimes the software cannot find a match or returns an incorrect match, which produces unwanted results

GESTURE INTERFACE

- This type of interface allows the user to control the device by swiping their finger or fingers across the screen, or by pinching their fingers together to 20cm in or out.
- This type of interface is commonly found on devices with touch screens.

END

The next tutorial will cover all the peripherals:

inputs, output and **storage**