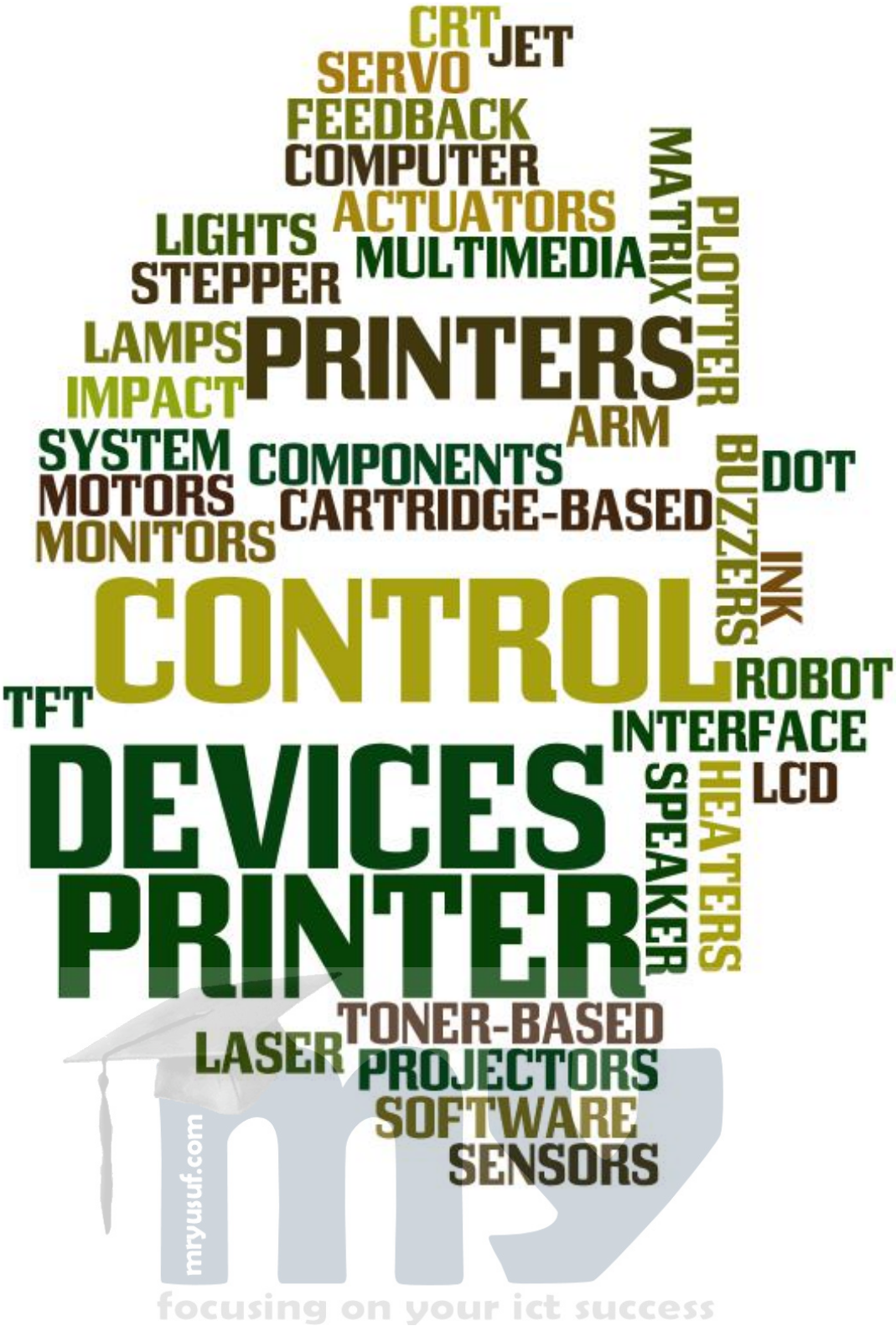
SECTION 2CD



INFORMATION &COMMUNICATION TECHNOLOGY | ©2012 www.mryusuf.com

Not permitted to copy/use without permission

SECTION 2CD – Output Devices

There is no point in having a computer that can do wonderful things unless it can tell you the results of what it has been doing. This is where we need an output device. There are many output devices that fall into two categories: those designed to be understood by humans and those that are more automatic, used as control devices.

Types of Output devices

A computer display, (monitor or screen) is a computer peripheral device capable of showing characters and/or still or moving images generated by a computer and processed by a Graphics card. Monitors generally conform to one or more display standards. Sometimes the name "display" suits better than the word "monitor". Some people also refer to computer displays as "heads", especially when talking about multiple displays connected to a single physical computer. Once an essential component of a Computer terminal, computer displays have long since become standardized peripherals in their own right.

Monitors (CRT)

The cathode ray tube (CRT) is a vacuum tube containing an electron gun (a source of electrons) and a fluorescent screen, with internal or external means to accelerate and deflect the electron beam, used to form images in the form of light emitted from the fluorescent screen. The image may represent electrical waveforms (oscilloscope), pictures (television, computer monitor), radar targets and others. The single electron beam can be processed in such a way as to display moving pictures in natural colours.

The CRT uses an evacuated glass envelope which is large, deep, heavy, and relatively fragile. Display technologies without these disadvantages, such as flat plasma screens and liquid crystal displays, displays have replaced CRTs in many applications and are becoming increasingly common as costs decline.

Application use

- Applications where space is not a problem.
- Applications where more than one user may need to view screen simultaneously such as in design use, e.g. when several designers may need to offer suggestions on a prototype.

Advantages

- Relatively cheaper than TFT monitors.
- Can display better quality images than TFT monitors in terms of colour display and refresh rate.
- Can be viewed from different angles.

Disadvantages

- Takes up a lot of desk space.
- Heavy to move around.
- Because of a flickering screen, long use can cause headaches and eyesight problems.

Monitors (TFT)

A thin film transistor (TFT) is a special kind of Field effect transistor made by depositing thin films for the metallic contacts, Semiconductor active layer, and Dielectric layer. The channel region of a TFT is a thin film that is deposited onto a substrate (often Glass, since the primary application of TFTs is in liquid crystal displays).

Most TFTs are not transparent themselves, but their electrodes and interconnects can be. The best known application of thin-film transistors is in TFT LCDs, a variant of LCD technology. Transistors are embedded within the panel itself, reducing crosstalk between pixels and improving image stability. As of 2004, all but the cheapest colour LCD screens use this technology.

Application use

- Applications where space is limited such as small offices.
- Applications where only one person needs to view the screen such as individual workstations.

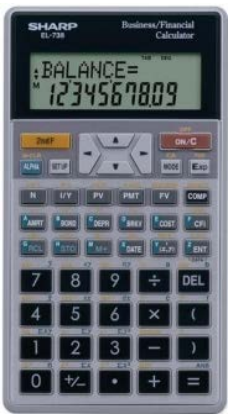
Advantages

- They produce less glare than CRT monitors.
- They emit less radiation than CRT monitors.
- Smaller and lighter to move around than CRT's.
- Uses much less power than a normal CRT monitor.

Disadvantages

- Better technology means more money to pay.
- The angle at which they can be viewed is limited.
- Screen is delicate and can be damaged by sharp object or excessive pressure.

Other types of monitors – Not listed in the Syllabus



Monitors (LCD)

A liquid crystal display (LCD) is a thin, flat display device made up of any number of color or monochrome pixels arrayed in front of a light source or reflector. It is often utilized in battery-powered electronic devices because it uses very small amounts of electric power.

Monitors (TFT - LCD)

A thin film transistor liquid crystal display (TFT-LCD) is a variant of liquid crystal display (LCD) which uses thin film transistor (TFT) technology to improve image quality. TFT LCD is one type of *active matrix* LCD, though it is usually synonymous with LCD. It is used in televisions, flat panel displays and projectors.

Not permitted to copy/use without permission

INFORMATION &COMMUNICATION TECHNOLOGY | ©2012 www.mryusuf.com

Plotter

A plotter (or Graph Plotter) is a Vector graphics printing device that connects to a computer. They are similar to printers.

Plotters print their output by moving a pen across the surface of a piece of paper. This means that plotters are restricted to line art, rather than raster (the representation of images as a collection of pixels) graphics as with other printers. They can draw complex line art, including text, but do so very slowly because of the mechanical movement of the pens. Plotters are incapable of creating a solid region of colour; but can hatch an area by drawing a number of close, regular lines.

Another difference between plotters and printers is that a printer is aimed primarily at printing text. This makes it fairly easy to control, simply sending the text to the printer is usually enough to generate a page of output. This is not the case of the line art on a plotter, where a number of printer control languages were created to send the more detailed information like "draw a line from here to here".

Early plotters worked by placing the paper over a roller which moved the paper back and forth for X motion, while the pen moved back and forth on a single arm for Y motion. Another approach involved attaching ball-point pens to drafting pantographs and driving the machines with motors controlled by the computer. This had the disadvantage of being somewhat slow to move, as well as requiring floor space equal to the size of the paper, but could double as a digitiser. A later change was the addition of an electrically-controlled clamp to hold the pens, which allowed them to be changed and thus create multi-coloured output.

Plotters are used primarily in technical drawing and CAD applications, where they have the advantage of working on very large paper sizes while maintaining high resolution. Another use has been found by replacing the pen with a cutter, and in this form plotters can be found in many garment and sign shops.

Application use

- CAD applications, particularly where large printouts are required such as A0 (in relation to page size).

Advantages

- High-quality, accurate drawings produced.
- Various thicknesses and colours of pens.
- Large-scale drawings possible.
- Can write notes or comments on a map, diagram or photographs that explain what they show.

Disadvantages

- Relatively more expensive compared to printers.
- Need enough workspace to store larger plotters.
- Can take a long time to draw a detailed page
- Only a few pens can be used at a time.

INFORMATION &COMMUNICATION TECHNOLOGY | ©2012 www.mryusuf.com

Not permitted to copy/use without permission

Feedback

Most useful control systems use feedback. Feedback occurs when the outputs from a control system change the inputs, usually to keep the system in a stable state.

Consider a refrigeration system which is used to keep food frozen at below -20°C. A temperature sensor is used to measure the temperature inside the freezer. The system contains a refrigeration unit to cool the freezer. If the temperature is below -20°C then the refrigeration unit is turned off to save energy. If the temperature rises above -20°C then the refrigeration unit is turned on to cool the food down.

The cooling system inside the freezer will repeatedly follow this sequence of actions:

1. The input from the temperature sensor causes the refrigeration unit to turn on because the temperature is above -20°C.
2. The refrigeration unit is turned on so the temperature falls.
3. The temperature becomes so cold that the temperature sensor causes the refrigeration unit to be turned off.
4. The refrigeration unit is off so the temperature in the freezer rises slowly.
5. The system goes back to step 1.

In this system the inputs first affect the outputs (temperature sensor causes refrigeration unit to turn on). Then the outputs affect the inputs (refrigeration unit changes temperature reading). Because the outputs affect the inputs we can say that the system involves feedback. The feedback keeps the system in a stable (cold) state.

Advantages and Disadvantages of Computer Control Systems

Advantages	Disadvantages
1. Computer systems respond faster than humans. 2. Computers rarely fail and can easily be replaced.	1. High cost of initial investment in computers. 2. Job losses as computers replace humans.

mryucom
focusing on your ict success

Examples of Computer Control Devices

Greenhouse:

A greenhouse is a building where plants are cultivated. A greenhouse is a structure with a glass or plastic roof and frequently glass or plastic walls; it heats up because incoming solar radiation from the sun warms plants, soil, and other things inside the building.

Air warmed by the heat from hot interior surfaces is retained in the building by the roof and wall.

- Water sprinklers or Humidifier help in controlling humidity
- Heaters coolers or air conditioners control temperature
- Light bulbs, Light intensity / level
- Motors are used for opening or closing windows, this helps with the temperature
- Fans can also be used to help with temperature

Lights (lamps)

Lighting refers to the devices or techniques used for illumination, usually referring to artificial light sources such as lamps or flashlights. Natural indoor lighting is by windows and skylights. Artificial indoor lighting is by means of lamps, today usually electric lights, but previously by gas, candles or oil lamps. Modern freestanding lamps typically have a Base which holds up a light bulb which is covered by a Lampshade. Modern portable lighting is typically a flashlight running on batteries. Indoor lighting is a form of Furnishing, and a critical part of Interior design.

Application use

- Lights are used in computer-controlled greenhouses to increase the amount of light for the plants.
- Many forms of lights are used in computer control, including dimmers inside the home and bright security lamps as part of an outside security system.

Heaters

An actuator is connected from the computer to the heater and set to switch the heater either on or off.

Application use

- Heating elements are needed in automatic washing machines to heat the water to the required temperature.
- In automatic cookers they are needed to heat the hotplates and the oven.
- They are an integral part of central heating systems as they are needed to heat the water before it is pumped to the radiators.
- They are required in computer-controlled greenhouses to increase the temperature of the greenhouse.

Robot Arm

A robotic arm is a robot manipulator, usually programmable, with similar functions to a human arm. The links of such a manipulator are connected by joints allowing either rotational motion (such as in an articulated robot) or translational (linear) displacement.

Robot arms are used in automotive assembly lines to perform a variety of tasks such as welding and parts rotation and placement during assembly.

In car paint spraying, the computer controls the movement of a robot arm which sprays parts of a car body. The arm must only spray when the body part is present and must then follow a programmed spraying path. The arm must stop if any foreign object, such as a human being, gets in its way.

See more on Robot Arms in Section 7.2 of the Grade 10 syllabus.