



CHAPTER 2

INPUT AND OUTPUT DEVICES

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Keyboards:

You should all know what a keyboard is so I shouldn't have to explain it. They are used to input data and type commands into the computer.

Advantages:

- Can quickly input text into a document
- Very easy to use

Disadvantages:

- Difficult to use if the user cannot use their arms/wrists (duh...)
- Is much slower than other data entry methods (we'll get to those in a bit)
- They are quite large and take up a lot of desk space

Computer mouses:

A mouse is the input device that controls the pointer on the computer. Again, I hope you are all familiar with using a mouse...

Advantages:

- Faster way of select items on a computer than using a keyboard
- Small size – requires less desk space when compared to a keyboard

Disadvantages:

- Again, difficult to use if the user cannot use their arms/wrists (I'm detecting a theme here...)
- Quite easy to damage, especially the old roller mouses
- Requires a flat surface to be able to use it

Touchpads:

A touchpad is the pointing device that is used on laptops (although can also be external). Usually a touch-sensitive pad that the user uses to control where the pointer on the screen goes by moving their finger across the touchpad

Advantages:

- Touchpads have all the same advantages as regular computer mice
- Touchpads are integrated into laptops removing the need for an external mouse. It also means the pointer can be controlled even if there is no flat surface nearby

Disadvantages:

- Surprise surprise, they cannot be used if the user cannot use the or arms/wrists
- More difficult to use than a regular computer mouse (i.e. tasks like dragging and dropping become more difficult)

Trackerball:

A trackerball is a basically a weird looking mouse. Instead of having the ball on the bottom of the mouse and moving the mouse around to move the cursor, the ball is on the side or the top and you rotate it with your finger or thumb to move the cursor. It is generally used by people with disabilities (i.e. RSI (Repetitive Strain Injury))

Advantages:

- Requires less accuracy than a mouse
- Easier to use by disabled people
- More robust than a mouse
- Needs less desk space than a mouse because you don't actually have to move it

Disadvantages:

- Costs more as they are not generally supplied with computers
- The user may need training on how to use it since they are not widely used

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Remote control:

A remote control uses infrared signals to control whatever it is controlling wirelessly. They are usually used for TVs, DVD players, volume control etc however; they are also used for controlling things industrially i.e. machinery

Advantages:

- They can be used from a reasonable distance away from the receiver
- Can be used to control hazardous things in industry, meaning the person controlling it does not need to get close to it and put themselves at risk

Disadvantages:

- Can't use your arms? Guess what? YOU CAN'T USE IT!
- There are things that can block the signal from the receiver like walls

Joysticks:

Basically the same as a mouse or trackerball, the user rotates the stick to control what is on the screen. They can also use the buttons on the joystick to make selections. They are mostly used in video gaming and simulators. A similar example to a joystick is a driving wheel. It performs basically the same thing with the same advantages and disadvantages, however; instead of rotating the joystick, you rotate a steering wheel instead.

Advantages:

- It is easier to control what is on the screen than if you were trying to use a keyboard
- For simulators, it feels more realistic making the experience more immersive

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Disadvantages:

- It is more difficult to control a cursor than if you were using a mouse

Touch screens:

I would be very surprised if you didn't know what a touch screen was. A touch screen is both an input and output device as it displays as well as taking inputs. The way it works is that the user control what the screen displays by selecting thing by tapping the screen, swiping to scroll, or by using gestures.

Advantages:

- It is faster to input and enter data than using a mouse and keyboard
- It is much easier to use than a mouse and keyboard
- They are very user-friendly and require little to no training to use

Disadvantages:

- It has a limited number of options on what it can do
- If the user has to use it frequently, it can lead to things like muscle strain and RSI (Repetitive Strain Injury)
- The screen can get dirty from all the touching and swiping, making it less responsive and difficult to see what it is displaying

Scanners:

A scanner is used to scan hard copies of documents and convert them into computer-readable images. They can be used to scan photographs, important documents or books (to ensure they are never lost) etc.

Advantages:

- The images can then be stored and edited once they have been scanned
- It is faster and more accurate than having to manually type in the data by hand
- You can recover damaged or destroyed documents if something were to happen to the original

Disadvantages:

- Depending on how good the scanner is, the quality of the scanned image can be quite bad
- They are not particularly fast at scanning the documents

Digital cameras:

Remember film-based cameras? Yeah, me neither. A digital camera stores and reads photos to and from an SD card. They connect to a computer via USB to transfer photos and videos, but can also use WiFi or Bluetooth.

Advantages:

- Produce better quality photos than traditional cameras
- faster to upload as you don't have to scan physical photos
- No need to develop film as it is all done digitally
- SD cards can save hundreds to thousands of photos

Disadvantages:

- Need a relatively large amount of knowledge on how to use a computer to be able to transfer the photos
- Images need to be compressed so they take up less storage space
However, with the introduction of better cameras on smartphones, the digital camera is slowly becoming obsolete, especially for casual photographers. For professionals not so much due to lens quality.

Microphones:

Right, so... microphones... You talk into them and they save it. The way a microphone works is that it uses what is called an Analogue to Digital Converter (ADC) that converts the analogue data (the voice) into a format that a computer can understand. The ADC is usually the computer's sound card.

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Advantages:

- It is faster to read the text and save it as audio than to type in the text by hand
- You can manipulate the audio while it is being recorded, saving the need to go back and edit it later
- It can be used in voice-activation systems (i.e. in a car) to improve safety as you are not taking your eyes off the road to use your phone

Disadvantages:

- Audio files are usually quite large and take up a lot of storage space
- Voice recognition isn't as accurate as typing in what you need

Sensors:

Sensors use ADCs (Analogue to Digital Converters) to change the physical quantity (i.e. temperature or moisture level) into a form that a computer can understand. Sensors are used to both monitor and control. When sensors are being used to monitor, they measure the quantity and save the data to a spreadsheet that is saved on the connected computer system.

Advantages:

- They take more accurate readings than a human
- Sensors do not have to take breaks so they can measure continuously
- Since the whole system is automatic, there is no need for a human to have to interfere. This can be helpful if the quantity that is being measured is dangerous (i.e. acidity of a substance)

Disadvantages:

- If there is something wrong with the sensor, it can mess up all the data that is saved to the computer system (for example, if the sensor gets dirty)

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Graphics tablets:

Graphics tablets are quite similar to regular tablets except they are used solely for drawing. They do not have an operation system and cannot be used without being connected to a computer (although nowadays there are graphics tablets that have the computer built-in, making them more like laptops). They are used for digital drawings, computer graphics and are even used instead of typing in countries like China and Japan where they have complicated characters.

Advantages:

- You can easily undo and modify drawings
- They are a much more accurate methods of drawing than using a mouse or trackerball
- They can detect pressure, so the brush stroke on the screen depends on how hard the user presses down with the stylus, making it very similar to drawing with a real pencil or pen

Disadvantages:

- They are much more expensive than a computer mouse or trackerball
- It generally takes longer to produce a drawing than with traditional pen and paper
- Sometimes the menus are not user-friendly
- It can be expensive to produce big drawings (i.e. A4, A3...)
- The screen can be easily damaged

Webcams:

Webcams are basically digital cameras that do not save videos and images. Instead, the videos and images are displayed on a connected computer and are either used to stream video (i.e. for a video call) or to save videos and pictures not to the webcam itself, but to the storage device of the connected computer.

Advantages:

- They do not have to be turned off. They can stay on and only be activated when they're needed. This is helpful for using immediate video calls (you do not have to waste time setting up the webcam)
- Their use for video calls allows people to have face-to-face conversations without having to waste time and money travelling

Disadvantages:

- They are extremely limited in what they can do
- Quite often they produce low quality images
- They have to have a computer to be connected to

Light pens:

These are pens that allow you to select things and interact with monitors that aren't touchscreens. The way they work is that the pen has sensors that detect changes in light. The computer uses this to detect the pens position on the screen by refreshing the screen 50 times every second. They can be used for selecting things and even drawing.

Advantages:

- They are more accurate than touch screens
- They are much smaller and portable than touchscreens
- They are extremely easy to use

Disadvantages:

- There can be lag when the pen is being used to draw
- They only work with CRT (Cathode Ray Tube) monitors
- They are not very accurate for drawing
- The technology is pretty old and outdated