

## Input Devices 1: The Most Common

### Keyboard



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- Text entry input device
- The standard selection of keys can be classified as follows:
  - **Alphanumeric keys**: The standard letters and numbers.
  - **Punctuation keys**: The comma, period, semicolon, and similar keys.
  - **Special keys**: This includes:
    - **Function keys** e.g. F3
    - **Arrow keys**
    - **Caps Lock keys**
    - Etc.
- Keyboards can have different key placements e.g.
  - **QWERTY** (the first six typing keys on the top row of letters spell QWERTY) – it was designed (for mechanical keyboards) to slow fast typists to avoid jamming the keys.
  - Another well-known design is the **Dvorak**, which has letters positioned for speed typing.

- Keyboards differ, for example some have 84 keys, some have 101 keys etc.

Ergonomic keyboard



Touch-screen keyboard



A virtual (laser) keyboard



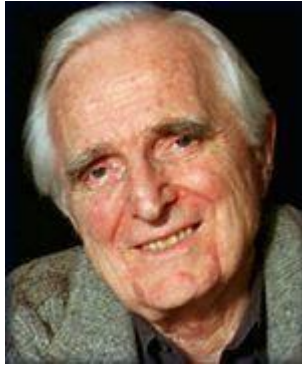
A roll-up keyboard

- **Ergonomic** keyboard:
  - A keyboard built on purpose to do less strain on the hands while typing on the keyboard.
  - **Carpal tunnel syndrome** (CTS) is a medical condition that affects the wrist and palm of the hands.

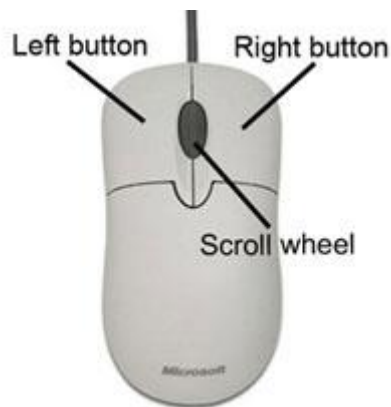
## Mouse

- It is an integral part of the **graphical user interface** (GUI) of any personal computer.
- The user can send commands by means of:
  - Movement: this will cause the cursor on the screen to move.
  - Left click: e.g. choose a menu option.

- Left double click: e.g. open an application.
- Right click: e.g. open a menu.
- Move scroll wheel: move page up or down.
- Not all mice are identical.
- Some are cordless.



Douglas Engelbart is the inventor of the mouse.



The most conventional kind of mouse

### *Trackball*

- This is another **pointing device**.
- Essentially, a trackball is a mouse lying on its back.
- To move the pointer, you rotate the ball with your thumb, your fingers, or the palm of your hand.
- The advantage of trackballs over mice is that the trackball is stationary so it does not require much space to use it.



Trackballs

### *TrackPoint*



- Also called a **pointing stick**.
- Used to move cursor.
- Found in some notebook computers.
- The TrackPoint is operated by pushing in the general direction the user wants the cursor to move.

### *Touchpad*



- A small, touch-sensitive pad.
- Used as a pointing device on some portable computers.

### Scanner

- Also known as optical scanner.
- Can read text or illustrations printed on paper and translate the information into a form the computer can use.
- It works by **digitizing** an image i.e. by dividing a picture into a grid of boxes.
  - Each box (called a **pixel**) is assigned a colour.
  - The matrix of pixels is called a **bit map**.
  - If only black and white pixels are present one bit for each pixel will be enough.
  - 8 bits for each pixel means that  $2^8$  colours can be represented (sometimes a pixel is represented by more than 8 bits e.g. 24).
  - The number of bits used to represent each pixel is called **bit depth**.



A hand-held and a flatbed scanner

- Most optical scanners sold today come with OCR (optical character recognition) packages. This system translates the image into ASCII characters.
- **Resolution**: The denser the bit map, the higher the resolution. Typically, scanners support resolutions of from 72 to 600 dpi.
- **Hand-held scanners** are adequate for small pictures and photos, but they are difficult to use if you need to scan an entire page of text or graphics.
- Larger scanners include machines into which you can feed sheets of paper. These are called **sheet-fed scanners**.
- A **flatbed scanner**, is like a photocopy machine.

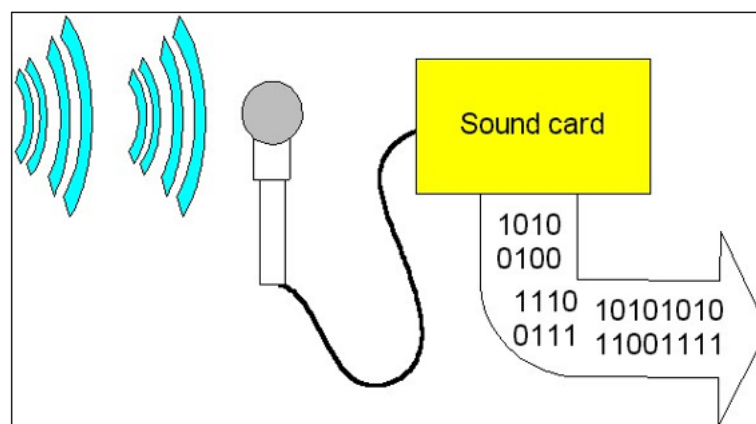
## Touch Screen



- A touch screen is a computer display screen that is also an input device.
- There are various technologies that implement touch screens.
- The technology is found on mobile phones and also on large monitors.

## Microphone

- For audio input.
- The microphone converts audio signals to electrical waves.
- The sound card converts the electrical waves to digital form.
- Highly sophisticated speech-recognition software can also recognize the spoken word and convert it to text.



Microphone

## Advantages and Disadvantages

Each device has its own advantages and disadvantages. Here we mention a few:

<b>Device</b>	<b>Advantage</b>	<b>Disadvantage</b>
<b>Keyboard</b>	Fast for entering text if one is well trained in touch typing.	User needs to learn to type to use it efficiently.
<b>Mouse</b>	Very efficient to use in GUI environments.	Needs extra space.
<b>Trackball</b>	Does not need extra space.	When moving the cursor they are less smooth than the mouse.
<b>TrackPoint</b>	Very small and fits between keyboard keys.	Takes some time to get used to.
<b>Touchpad</b>	Does not need extra space.	They are more difficult when doing operations such as 'drag and drop'
<b>Scanner</b>	With the right software it can read pictures and also text.	A flatbed scanner takes quite some space from your office table.
<b>Touch screen</b>	Very handy with smartphones as you do not need an extra input device.	Screen often gets dirty.
<b>Microphone</b>	Faster to read in text than to type it using a keyboard.	Voice recognition software isn't as accurate as typing in manually.

### *Interpretation of the Input*

Once the input is entered to the system, whether explicitly by humans or by sensors, it is then up to the software to interpret the meaning of the sequence of ones and zeros, for example 00000110 may represent the number 6 or it may represent a letter of the alphabet or even the frequency of a musical note or an instruction like 'multiply'.

### Questions

- 1) What do we mean by alphanumeric symbols?
- 2) What use do function keys have?
- 3) What is the difference between a QWERTY keyboard and the other keyboards?
- 4) What is ergonomics about?
- 5) What is a GUI?

- 6) What do we mean by a pointing-device? Give three examples of pointing input devices.
- 7) A scanner is used to digitize a picture that is 2 by 3 inches. The resolution chosen is 200 dpi and a bit depth of 16 bits. How many bytes does the scanned picture consist of?
- 8) Smartphones usually have a touch screen. Name one other situation where a touch screen is used.
- 9) What does speech-recognition software do?