

# Input Devices

## Keyboard

### Saitek Computer Keyboard



- 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



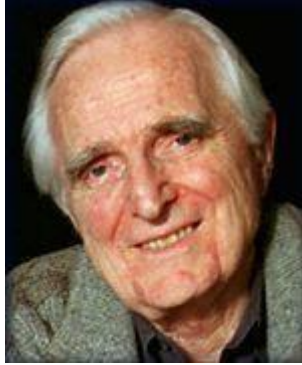
A roll-up keyboard

- **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.

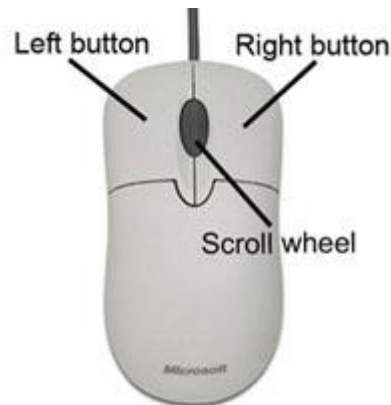
## Mouse

- 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.



A touchpad

## Joystick

- A joystick is a lever that moves in all directions and controls the movement of a pointer or some other display symbol.
- Joysticks are used mostly for computer games, but they are also used occasionally for **CAD/CAM** systems and other applications.
- It often has one or more pushbuttons, called switches, whose position can also be read by the computer.



Joysticks

## 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 photocopier machine.

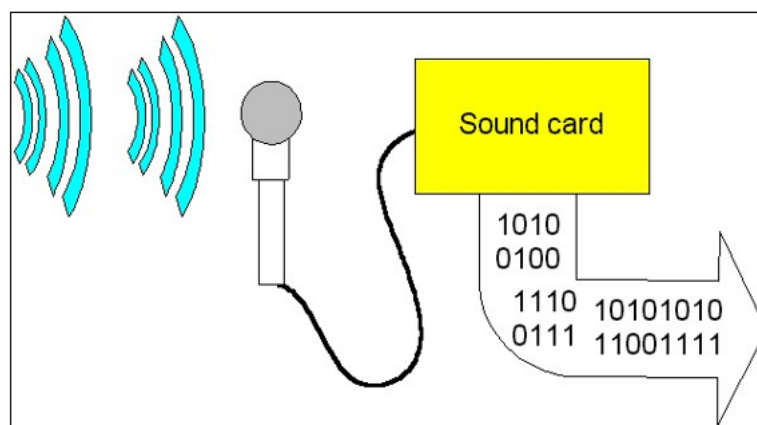
## Touch Screen



- 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.

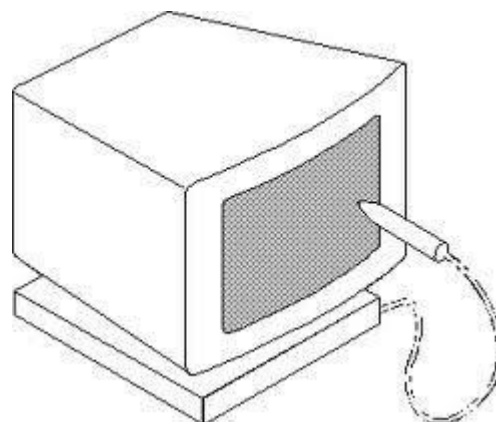
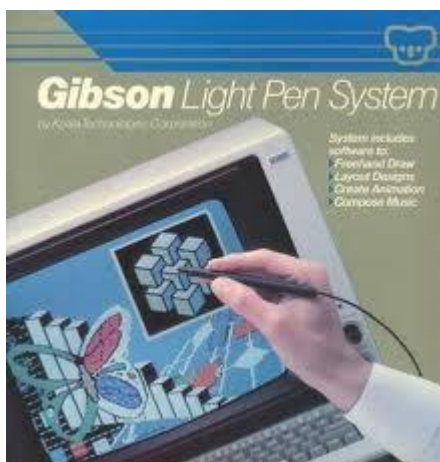
## Microphone

- 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

## Light Pen



A light pen

- A light-sensitive stylus wired to a video terminal used to draw pictures or select menu options.
- The user brings the pen to the desired point on screen and presses the pen button to make contact.

## Digitizing Tablet



Digitizer Tablet PC's



Digitizing tablets

- Enables the user to enter drawings and sketches into a computer.
- A digitizing tablet consists of an electronic tablet and a cursor or pen. A **cursor** (also called a **puck**) is similar to a mouse, except that it has a window with cross hairs for pinpoint placement, and it can have as many as 16 buttons.
- A pen (also called a **stylus**) looks like a simple ballpoint pen but uses an electronic head instead of ink.



- The tablet contains electronics that enable it to detect movement of the cursor or pen and translate the movements into digital signals that it sends to the computer.

## Digital Camera

- A digital camera (or **digicam** for short) is a camera that takes video or still photographs, or both, digitally by recording images via an electronic image sensor.



Digital cameras

- Many devices include digital cameras built into or integrated into them e.g. mobile phones.
- Other devices are: PDAs and laptops.
- Digital cameras can do things film cameras cannot:
  - displaying images on a screen immediately after they are recorded,
  - storing thousands of images on a single small memory device,
  - recording video with sound,
  - deleting images to free storage space

## Webcam

- A webcam is a video camera which feeds its images in real time to a computer or computer network, often via **USB**, **Ethernet** or **Wi-Fi**.
- Can be used for:
  - Videophones or videoconference stations.



## OMR

- **Optical Mark Recognition** (also called **Optical Mark Reading**) is the process of capturing human-marked data from document forms such as surveys and tests.
- Often uses a dedicated scanner but can also be done on a PC system with scanner.



OMR form

## OCR



Hand-held OCR

- Optical character recognition is the translation of images of handwritten, typewritten or printed text into machine-editable text.

## Barcode

- A barcode reader (or barcode scanner) is an electronic device for reading printed barcodes.

- The main advantage of using a barcode system is that any price change only needs to be made to the database and not every single product package.
- Barcodes are also used on books to show the book's ISBN number. They are also used on library tickets so that when your ticket is scanned, the database brings up your account and any books which you still have out on loan are displayed.



Bar code

## Magnetic Stripe Card

- A card capable of storing data by modifying the magnetism on a band of magnetic material on the card.
- Magnetic stripe cards are commonly used in credit cards, identity cards, and transportation tickets.



A card with a magnetic stripe

## Gesture recognition



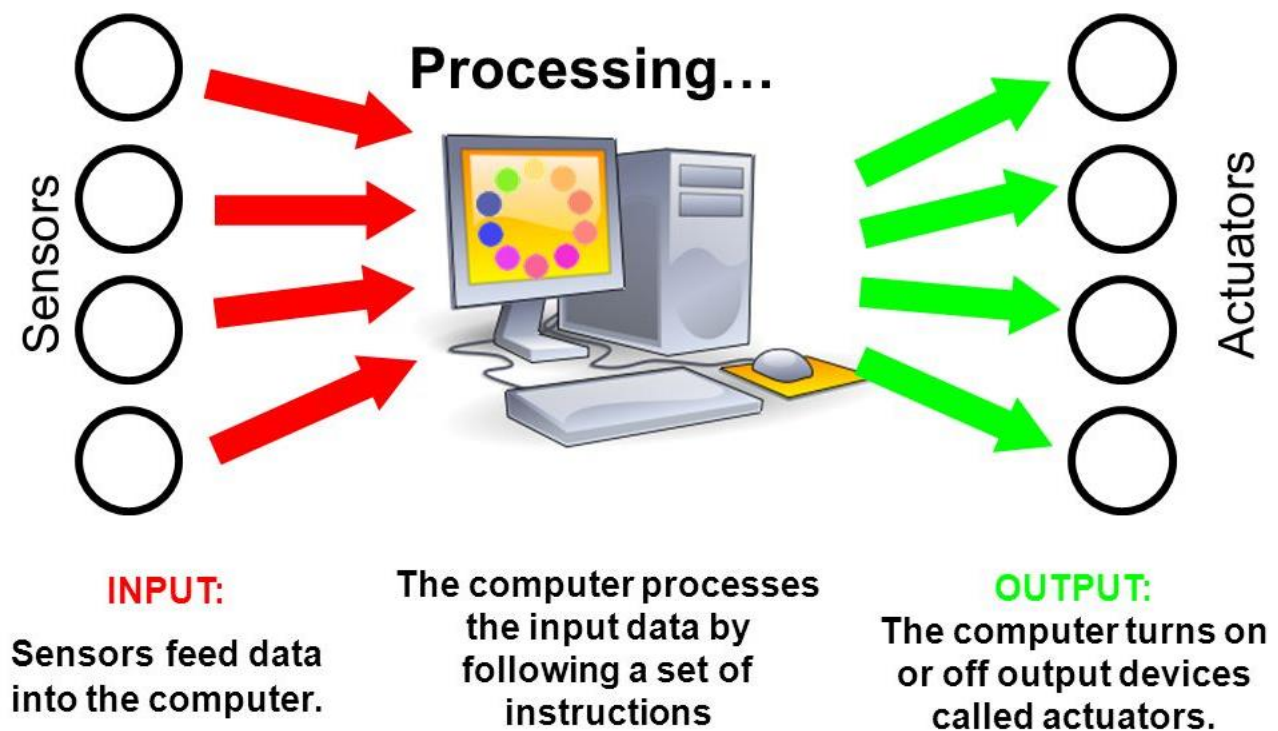
Gesture recognition

- Inputting by means of human gestures.
- Gestures commonly originate from the face or hand.
- The technology requires:
  - Cameras, and
  - Computer vision algorithms.

## Sensors

- Sensors record data about the physical environment around them, then send the data to a computer.
- Advantages of using computer sensors. They are:
  - Reliable
  - Accurate
  - Never get tired
- Types of sensors:
  - Magnetic Field Sensor
- Motion (infra-red) Sensor
  - Detects movement / heat from objects.

- Temperature Sensor
- Sound Sensor
- Moisture / Humidity Sensor
- Pressure Sensor
- Gas Sensor
- Light Sensor
- pH Sensor
  - Measures how acidic or alkaline a material is.



## Exercise

1. What is the difference between a QWERTY keyboard and a Dvorak keyboard?
2. What do we mean by Carpal tunnel syndrome
3. What is ergonomics about?
4. What is different in an ergonomic keyboard?
5. What are alphanumeric keys?
6. Name one advantage and one disadvantage of keyboards.

7. What is a GUI?
8. Cordless mice may rely on infrared or radio waves. What is the difference between these two technologies?
9. Give one advantage and one disadvantage of mice.
10. Give one advantage and one disadvantage of trackballs.
11. Give one advantage and one disadvantage of track-points.
12. Give one advantage and one disadvantage of touchpads.
13. Give one advantage and one disadvantage of joysticks.
14. What is CAD/CAM system?
15. Give one advantage and one disadvantage of scanners.
16. Explain the following terms:
  - a. Bit map
  - b. OCR
  - c. ASCII
  - d. Resolution
  - e. dpi
  - f. Bit depth
17. Give one advantage and one disadvantage of touch screens.
18. Give one advantage and one disadvantage of microphones.
19. Explain the following terms:
  - a. sound card
  - b. speech-recognition software
20. Name one application of a digitizing tablet.
21. Explain the following terms. They are related to digital cameras.
  - a. 10 megapixel
  - b. cropping
  - c. 10X optical zoom
  - d. digital zoom

- e. JPEG
- f. RAW
- g. LCD
- h. ISO
- i. shutter speed
- j. aperture
- k. depth of field

22. A webcam is a video camera which feeds its images in real time to a computer or computer network, often via USB, Ethernet or Wi-Fi. Explain.
23. Give one advantage of MICR.
24. Mention one application where the following input techniques can be used (one application for each):
- a. OMR
  - b. OCR
  - c. Barcode
  - d. Magnetic stripe card