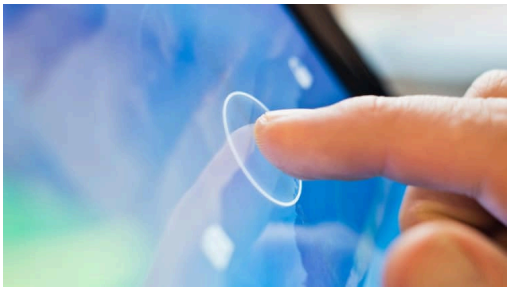
Input Device

- a piece of computer hardware equipment used to provide data and control signals to an information processing system such as a computer or information appliance.
- It can be a hardware or peripheral device used to send data to a computer
- allows users to communicate and feed instructions and data to computers for processing, display, storage and/or transmission.

Examples of Input Devices:

1. **Keyboard**: Used for typing text and commands. It's the primary input device for desktops and laptops.
   Process: When a user presses a key, the mechanical or virtual switch under the key sends an electronic signal to the computer, which maps the key press to a specific character, symbol, or command.

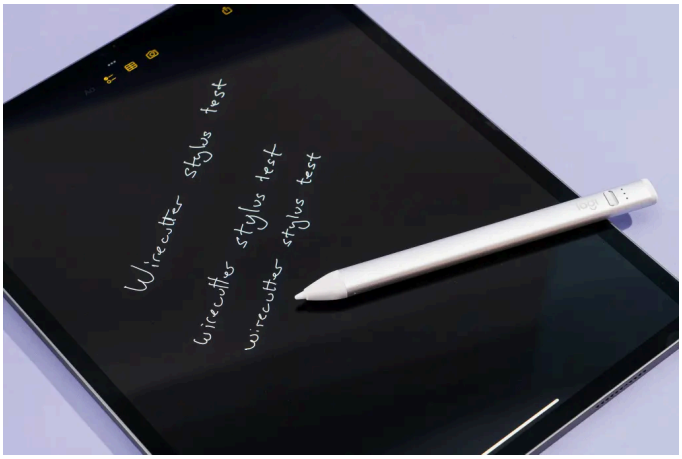
2. **Mouse**: A pointing device that allows users to navigate graphical interfaces, select objects, and issue commands through clicking and scrolling.
   Process: As the mouse moves, sensors (typically optical or laser) detect movement relative to the surface. The movement is translated into corresponding motion of the cursor on the screen. Clicking sends a specific command, such as selecting an item or opening a file.



3. **Touchscreen**: A direct manipulation device where users interact by touching the screen itself. Common on smartphones, tablets, and some laptops.
   Process: Touchscreens use either capacitive or resistive technology. When a user touches the screen, it detects the touch's location via the interruption of electric fields or pressure. This input is interpreted as tapping, swiping, or dragging based on how the user interacts.

4. **Trackpad**: A touch-sensitive surface, typically found on laptops, used as a mouse alternative for controlling a pointer.
   Process: Similar to a touchscreen, but typically smaller. A trackpad senses finger movement and translates it into pointer movement on the screen. It also recognizes multi-touch gestures like pinching or swiping.

5. **Microphone**: Converts sound (speech, for example) into digital input, often used for voice commands, speech recognition, and communication.
   Process: The microphone captures sound waves and converts them into electrical signals. These signals are processed by the computer's sound card and transformed into digital input that can be used for voice recognition, commands, or communication.



6. **Stylus**: A pen-like device used for precise input, often in design or note-taking applications on devices like tablets.
   Process: The stylus interacts with a touch-sensitive surface or digitizer, which senses pressure, tilt, and motion. The device then converts these movements into commands for drawing, writing, or selecting items on the screen.

7. **Joystick**: A gaming and control device used to input directional commands in video games or control machinery.
   Process: The joystick sends input based on the angle and direction it is tilted. Sensors in the joystick convert this tilt into electrical signals that the computer

processes to control movement within an application, such as a video game or simulation.

8. **Scanner**: Converts physical documents or images into digital form.
   Process: The scanner moves a light beam across a document or image, detecting the variations in light and dark areas. It converts the scanned data into digital form, which the computer processes as an image or text file.

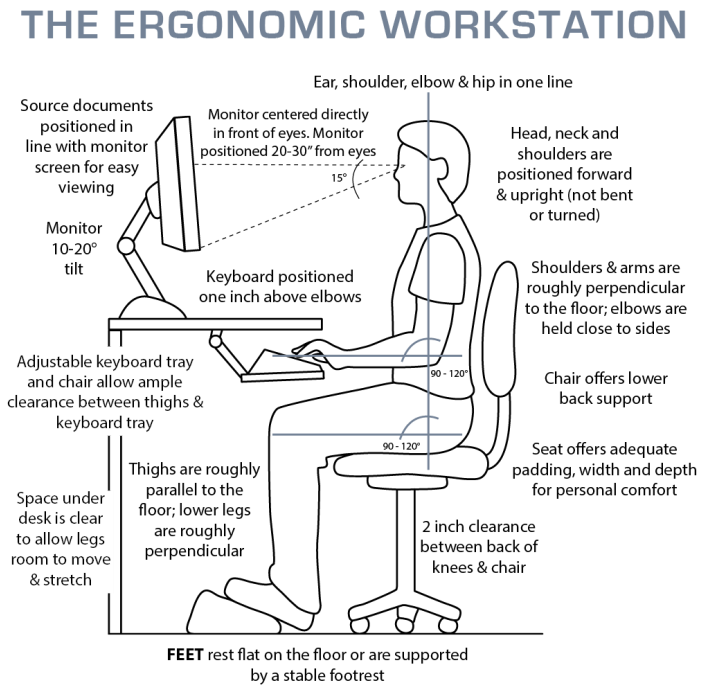
9. **Camera**: Used for capturing visual input, either for photos, videos, or facial recognition purposes.
   Process: A digital camera uses sensors to capture light and convert it into electronic signals. These signals are processed by the computer to produce images or video. Cameras can also detect specific movements or patterns for tasks like facial recognition or gesture control.

10. **Gesture-based controllers**: Devices like Microsoft's Kinect or VR controllers that capture hand or body movements for interaction.

Process: Devices like Kinect or VR controllers use infrared sensors, cameras, or gyroscopes to detect body movements or hand gestures. These movements are mapped to specific actions within the system, such as controlling characters or interacting with virtual objects.

Ergonomics

- Ergo - work, Nomo - Law (It's essentially the “laws of work” or “science of work”)
- designing products, systems, and environments that are comfortable, efficient, and safe for human use.



Device	Wrong Way	Result	Correct Way

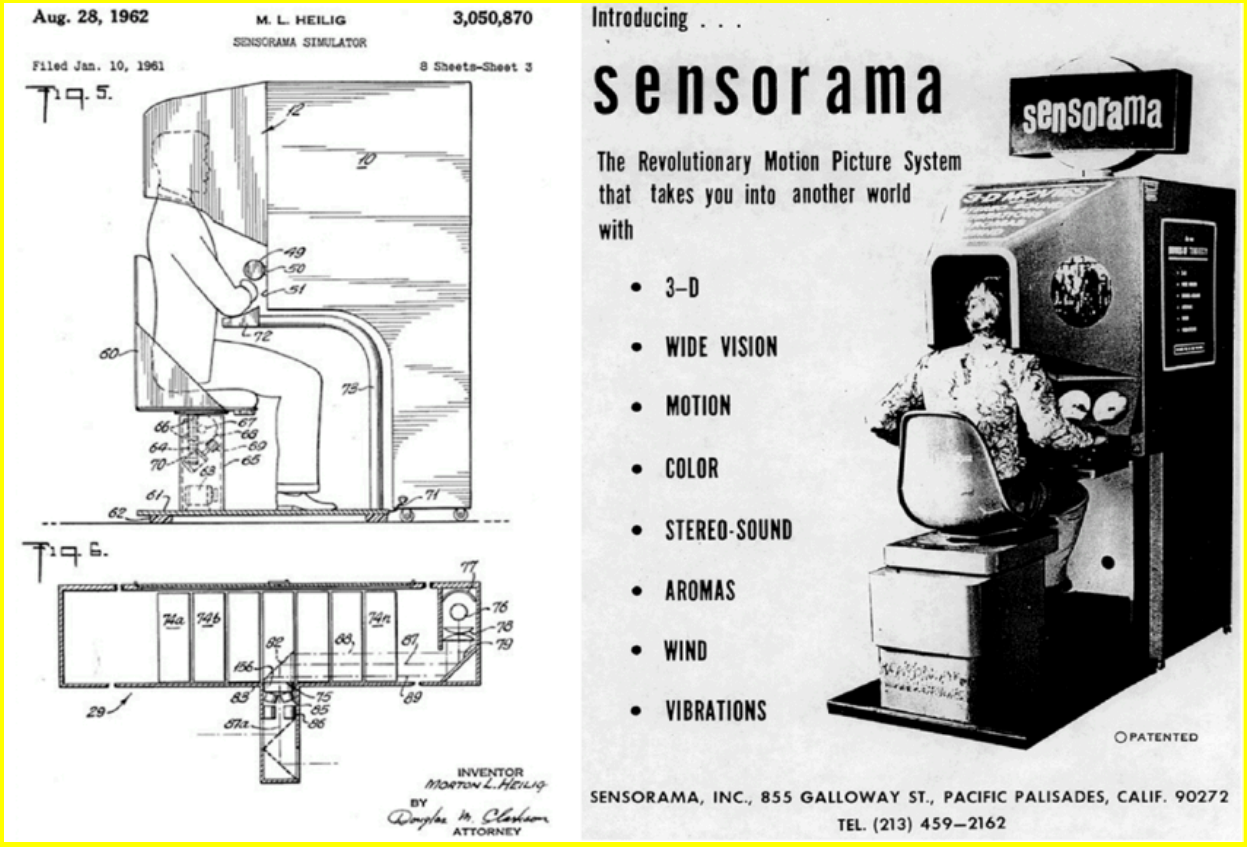
Keyboard	• Typing with one hand • Fingers and wrist bent. • Shoulders not in rest position.	• Swelling of connective tissues. • Swelling of thumb. • Numbness in fingers.	• Keeps wrists in line with forearm • Don't use wrist rest area in typing • Use Split keyboards
Mouse	• Using the mouse on an uneven or hard surface. • Holding the mouse too tightly or with a stiff wrist. • Positioning the mouse too far from the body, causing overextension.	• Poor pointer control, resulting in frustration and decreased productivity. • Fatigue and discomfort in the arm, shoulder, or neck due to poor posture.	• Hold the mouse gently, keeping your hand and wrist relaxed and straight. • Use a smooth mouse pad for easy gliding and precise control. • Position the mouse close to your body, keeping your elbow at a 90-degree angle and your forearm parallel to the desk.
Monitor	• Placing the monitor too high or too low. • Sitting too close or too far from the screen. • Using the monitor in a poorly lit environment.	• Neck and back pain from looking up or down for extended periods. • Eye strain and fatigue due to improper distance or screen glare. • Poor posture, leading to discomfort and long-term health issues.	• Position the monitor so the top of the screen is at or just below eye level. Your head should be in a neutral position. • Sit about **20 to 30 inches (50-75 cm)** away from the screen, maintaining a comfortable viewing distance. • Adjust lighting to minimize glare, and ensure the room is well-lit to reduce eye strain. • Tilt the monitor slightly back (10-20 degrees) so that you can look straight ahead without tilting your head.

Why Design for Ergonomics?

- **Enhances Comfort**: Ensures that products and interfaces are comfortable to use, reducing physical strain and discomfort.
- **Prevents Injuries**: Reduces the risk of repetitive strain injuries and musculoskeletal problems by promoting proper posture and movement.
- **Improves Efficiency**: Creates intuitive and user-friendly designs that facilitate more efficient and effective interactions.
- **Boosts User Satisfaction**: Leads to a better overall experience by aligning with human capabilities and preferences, increasing user satisfaction and productivity.

Virtual Reality

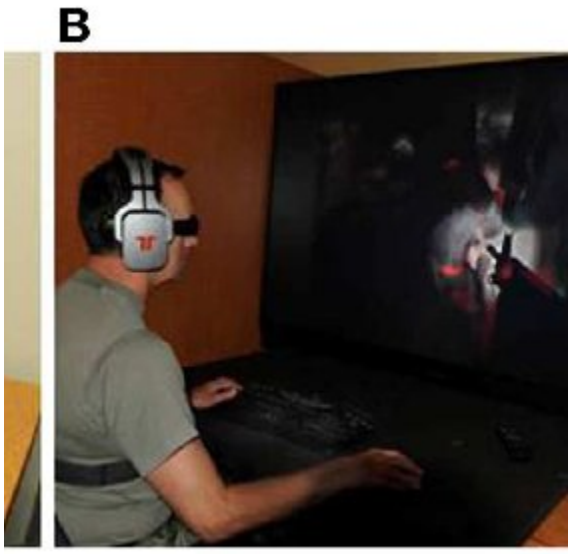
- The definition of 'virtual' is near and 'reality' is what we experience as human beings.
- Virtual Reality means feeling the imaginary(virtual) world, rather than the real one. The imaginary world is a simulation running in a computer.
- Virtual reality is the term used for computer generated 3D environments that allow the user to enter and interact with alternate realities.



History

- More than one person has been involved in the development of this technological system.
- In 1950's visionary cinematographer **Morton Heilig** built a single user console called **Sensorama**. This enabled the user to watch television in 3 dimensional ways.

Types of Virtual Reality



1. Non-Immersive VR:

Provides a VR experience through a screen or monitor without immersive elements like head tracking or 3D depth perception. The user interacts with the virtual environment using a keyboard, mouse, or game controller.

Example: Virtual reality applications on a computer or console where the experience is viewed on a traditional screen.

Usage: Often used for training simulations or games where full immersion is not required.

2. Semi-Immersive VR:

Offers a higher level of immersion than non-immersive VR by using large screens or projection systems to surround the user with the virtual environment. Head tracking or basic motion controls may be included.

Example: VR setups with large projection screens or panoramic displays used for simulation or educational purposes.

Usage: Used in applications like flight simulators or educational simulations where full immersion is less critical.

3. Fully Immersive VR:

Provides . It often includes hand controllers or haptic feedback devices to enhance interaction.

Example: Systems like Oculus Rift, HTC Vive, or PlayStation VR, where users are fully surrounded by and interact with the virtual environment.

Usage: Used in gaming, simulations, and training where a high degree of immersion and interaction is required.

4. Augmented Reality (AR) and Mixed Reality (MR):

Although not purely VR, these technologies blend virtual elements with the real world. AR overlays digital content onto the real environment through devices like smartphones or AR glasses, while MR allows for interactive experiences where virtual objects interact with the real world.

Example: Pokémon GO (AR) or Microsoft HoloLens (MR).

Usage: Useful in applications like navigation, gaming, and collaborative work, where blending real and virtual elements enhances the experience.

Use of VR in various industries or activities:

1. **Virtual Reality in the Military:**
    - VR allows soldiers to practice combat and equipment handling in a safe, virtual environment, visualize military strategies, and train on machinery without using real equipment.
2. **Virtual Reality in Healthcare:**
    - VR helps doctors and surgeons practice procedures, supports patient therapy for conditions like phobias and pain, and provides distraction to reduce pain during treatments.
3. **Virtual Reality and Education:**
    - VR makes learning more engaging by letting students explore virtual worlds, take virtual field trips, and practice skills in a hands-on, interactive way.
4. **Virtual Reality and Scientific Visualization:**
    - VR helps scientists view and interact with complex data in 3D, simulate scientific phenomena, and explore virtual models for better understanding and analysis.
5. **Virtual Reality in Entertainment:**
    - VR enhances entertainment by immersing users in video games, allowing them to attend virtual concerts and events, and participate in interactive stories and adventures.