

UNIT – IV

APPLICATIONS

Human Factors in VR – Methodology and Terminology – VR Health and Safety Issues – VR and Society-Medical Applications of VR – Education, Arts and Entertainment – Military VR Applications
– Emerging Applications of VR – VR Applications in Manufacturing – Applications of VR in Robotics
– Information Visualization – VR in Business – VR in Entertainment – VR in Education.



4.1) HUMAN FACTORS IN VR:

METHODOLOGY AND TERMINOLOGY:

Virtual Reality (VR) is a powerful technology that immerses users in computer-generated environments. Human factors play a crucial role in VR experiences, influencing user comfort, safety, and overall satisfaction. Here's an overview of the methodology and terminology related to human factors in VR, as well as considerations for health and safety issues:

1. USER EXPERIENCE (UX) DESIGN:

- UX design in VR involves creating interfaces, interactions, and environments that are intuitive, comfortable, and engaging for users. This includes considerations for navigation, feedback, and overall user satisfaction.

2. PRESENCE:

- Presence refers to the feeling of "being there" in the virtual environment. Achieving a sense of presence is essential for a compelling VR experience. Factors influencing presence include visual fidelity, audio immersion, and realistic interactions

3. COMFORT AND SIMULATOR SICKNESS:

- Comfort is a critical factor in VR experiences. Simulator sickness, also known as motion sickness, can occur if there's a disconnect between the user's visual and vestibular systems.

Mitigating simulator sickness involves careful design of motion, frame rates, and other factors.

4. FIELD OF VIEW (FOV):

- FoV refers to the extent of the visual field that a VR headset can display. A wider FoV often enhances immersion, but it also requires more powerful hardware and can impact performance.

5. FRAME RATE:

- The frame rate at which VR content is rendered is crucial for a smooth and comfortable experience. Lower frame rates can lead to motion sickness, so maintaining a high and consistent

frame rate is essential.

6. INTERACTIVITY AND INPUT DEVICES:

- The design of input devices and the level of interactivity in VR environments greatly influence the user experience. Considerations include the design of controllers, haptic feedback, and natural hand interactions.

7. ERGONOMICS:

- The design of VR hardware, including headsets and controllers, should consider ergonomics to ensure user comfort during extended use. This includes factors such as weight distribution, padding, and adjustability.

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8. ACCESSIBILITY:

- Accessibility in VR involves designing experiences that can be enjoyed by users with diverse abilities. This includes considerations for users with visual, auditory, or mobility impairments.

9. COGNITIVE LOAD:

- Managing cognitive load is essential to prevent user fatigue and maintain engagement. VR experiences should present information in a way that is easy to understand, and interactions should be intuitive.

VR HEALTH AND SAFETY ISSUES:

1. EYE STRAIN AND FATIGUE:

- Prolonged use of VR may lead to eye strain and fatigue. Users are advised to take breaks and adjust the headset to minimize discomfort.

2. PHYSICAL SPACE AWARENESS:

- Users may be unaware of their physical surroundings while immersed in VR. This can lead to collisions with real-world objects. Designers should implement boundary systems to warn users when they are nearing physical boundaries.

3. MOTION SICKNESS:

- Motion sickness is a common concern in VR. Designing experiences with smooth motion, reducing latency, and providing comfort options can help mitigate motion sickness.

4. IMPACT ON POSTURE:

- Extended use of VR may impact posture, leading to discomfort or musculoskeletal issues.

Users should be encouraged to take breaks and maintain good posture.

5. SEIZURE RISK:

- Some individuals may be sensitive to certain visual stimuli, potentially triggering seizures.

VR content creators should follow guidelines to minimize seizure risks.

6. HEAT AND DISCOMFORT:

- VR headsets can generate heat, leading to discomfort during extended use. Proper ventilation and design considerations can help manage heat-related issues.

7. AGE AND DEVELOPMENTAL CONSIDERATIONS:

- VR may impact individuals differently based on age and developmental stages. Guidelines exist to ensure that VR experiences are suitable for various age groups.

8. HYGIENE:

- Shared VR headsets may raise hygiene concerns. Regular cleaning and hygiene practices, such as using removable face cushions, can address this issue.

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9. CYBERSICKNESS:

- Cybersickness, similar to motion sickness, can occur due to the sensory conflict between virtual and physical motion. Design choices that minimize sensory conflicts help reduce cybersickness.

TERMINOLOGY IN VR HEALTH AND SAFETY:

1. CYBERSICKNESS:

- A term used to describe the discomfort or sickness induced by the use of virtual reality, similar to motion sickness.

2. LATENCY:

- The delay between a user's action in VR and the corresponding response in the virtual

environment. Low latency is essential for a smooth and comfortable experience.

3. HAPTIC FEEDBACK:

- The use of tactile sensations or vibrations in controllers to simulate the sense of touch in VR interactions.

4. ROOM-SCALE VR:

- VR experiences designed for physical movement within a defined physical space. Roomscale VR allows users to walk around and interact with the virtual environment.

5. TELEPORTATION LOCOMOTION:

- A VR locomotion technique where users can teleport to different locations within the virtual environment to avoid motion sickness.

6. CHAPERONE SYSTEM:

- A safety feature in VR systems that provides a visual boundary or warning when users approach the physical boundaries of their play area.

7. FOV MASK:

- A visual representation within the VR headset that indicates the limits of the user's field of view.

8. SIMULATOR SICKNESS:

- A term used to describe the nausea, discomfort, or dizziness experienced by some users in response to virtual motion in VR environments.

9. GUARDIAN SYSTEM:

- A safety feature similar to the chaperone system that defines a virtual boundary within which users can move safely in VR.

10. HMD (HEAD-MOUNTED DISPLAY):

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- The hardware device worn on the head that includes displays and sensors to provide the VR experience.