



**VIRTUAL REALITY AND ITS CHARACTERISTICS**

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**Abstract**

This article examines the concept of virtual reality, its fundamental characteristics, types, and technological components. Virtual reality (VR) is defined as an interactive technology that creates the illusion of a user's presence and movement within a computer-generated environment. The study highlights the theoretical foundations of VR, its evolution, and its role as a modern form of human existence and communication. Special attention is given to VR tools such as Head-Mounted Displays, Motion Parallax 3D displays, CAVE systems, and data gloves. The findings suggest that virtual reality is becoming an essential component of modern information technologies, transforming human perception and interaction with digital environments.

**Keywords**

virtual reality (VR), virtual world, Head-Mounted Display (HMD), Motion Parallax 3D display, CAVE, data gloves, digital environment.

**Introduction**

Virtual reality is an interactive technology that enables the creation of an artificial environment in which a person experiences the illusion of movement and presence similar to real life. Instead of perceiving objective reality through natural sensory organs, users interact with artificially generated computer information through specialized interfaces, computer graphics, and audio systems.

Although virtual reality does not physically exist and cannot be touched, tasted, or smelled, it provides a sense of presence. Users can enter this simulated environment, observe it, interact with it, and even modify it. Thus, virtual reality represents a unique form of human existence and a distinct cultural mode of communication.

The idea of creating computer-controlled worlds dates back to the mid-1960s. Since then, VR technologies have evolved significantly and sparked discussions about their transformative impact on human consciousness and society. Today, information technology not only serves as a



tool for understanding the world but also replaces traditional verbal cognition with audiovisual methods, creating an illusion of immersion in an artificial environment perceived as real.

The term “virtual reality” was introduced in the late 1970s at the Massachusetts Institute of Technology by Jaron Lanier, who later founded the first virtual reality company in 1984. The concept refers to a computer-generated environment that simulates human presence. The term “virtual” (from Latin *virtualis*, meaning “possible”) denotes a non-material form of existence, contrasting with physical reality.

### **Methods**

This study is based on theoretical analysis, comparative methods, and generalization of scientific literature on virtual reality technologies. The classification of VR systems, analysis of their functional characteristics, and examination of their technological components were conducted. The study also reviews existing VR platforms and tools to identify their practical applications and limitations.

### **Results**

#### **Types of Virtual Reality**

Virtual reality technologies can be categorized into several types:

##### **1. Fully immersive VR systems**

These systems provide a highly detailed and realistic simulation of virtual environments. They require high-performance computers and specialized equipment capable of tracking user movements and responding in real time.

##### **2. Non-immersive VR systems**

These include screen-based simulations, audio-visual systems, and control devices. Although they do not fully meet VR requirements, they offer a stronger impact compared to traditional multimedia tools.

##### **3. Shared virtual environments**

Platforms such as *Second Life* and *Minecraft* represent virtual worlds with social interaction elements. While they may not provide full immersion, they enable effective communication between users.

##### **4. Internet-based VR technologies**

These systems rely on web technologies such as Virtual Reality Markup Language (VRML) and similar frameworks. Future developments are expected to further integrate VR with internet technologies.

### **Applications of Virtual Reality**

Virtual reality is widely used beyond the gaming industry. Platforms such as 3D immersive collaboration environments enable users to organize work, explore virtual spaces, and collaborate remotely. This concept is often referred to as “collaboration with a sense of presence.”

### **Tools and Components of Virtual Reality**

Several key tools and components are used in VR technologies:

- **Head-Mounted Display (HMD):**



A helmet-like device equipped with displays for each eye, lenses for image correction, and tracking systems for head movement.

- **Motion Parallax 3D Displays:**

Provide depth perception by adjusting images based on user movement.

- **CAVE (Cave Automatic Virtual Environment):**

A room-sized immersive VR system that projects images on walls and floors.

- **Data Gloves:**

Devices that allow users to interact with virtual objects through hand movements.

Modern VR systems rely on sensors such as gyroscopes, accelerometers, and magnetometers to ensure accurate tracking of head position and movement. Key performance factors include wide field of view, precise tracking, and high-quality rendering.

### **Discussion**

Virtual reality represents a new stage in the evolution of information technologies. It transforms traditional methods of perception and cognition by replacing verbal communication with immersive audiovisual experiences. While VR enhances interaction and creativity, it also raises philosophical and social questions about the nature of reality and human perception.

The integration of VR into various fields, including education, healthcare, and industry, demonstrates its growing importance. However, achieving full immersion and effective user interaction remains a key challenge for future development.

### **Conclusion**

Virtual reality is a powerful technological innovation that creates artificial environments simulating real-world experiences. Despite its intangible nature, it has a significant impact on human perception, communication, and activity. As VR technologies continue to evolve, they are expected to play a crucial role in shaping the future of digital interaction and knowledge acquisition.

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