Volume 2, Issue 10, October 2024 **ISSN (E):** 2938-3757

BASIC CONCEPTS OF VIRTUAL AND ADDED REALITY IN TEACHING INFORMATION

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Abstract
Virtual laboratories and simulations are becoming the main tool for studying complex subjects such as chemistry and physics, where dangerous experiments can be safely reproduced. AR, on the contrary, adds digital elements to a real-life setting, making it useful for studying visualization-related disciplines such as anatomy or history, where students can see real-time reconstructions of objects or events. An important advantage of AR is accessibility: mobile devices make this technology available for widespread use both in schools and at home.

Keywords: Virtual reality (VR), 3D effect, augmented reality (AR), ICT, 3D audio, field of view (FOV), QR code, 3D models, animation, specialized headsets (such as Oculus Rift or HTC Vive), dedicated headsets (such as Oculus Rift or HTC Vive), dedicated headsets (such as Oculus Rift or HTC Vive), AR glasses (such as Microsoft HoloLens or Google Glass).

ОСНОВНЫЕ ПОНЯТИЯ О ВИРТУАЛЬНОЙ И ДОПОЛНЕННОЙ РЕАЛЬНОСТИ В ОБУЧЕНИИ ИНФОРМАТИКЕ

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Аннотация:
Виртуальные лаборатории и симуляции становятся основным инструментом для изучения сложных предметов, таких как химия и физика, где опасные эксперименты могут быть безопасно воспроизведены AR, напротив, добавляет цифровые элементы к реальной обстановке, что делает его полезным для изучения дисциплин, связанных с визуализацией, таких как анатомия или история, где студенты могут видеть реконструкции объектов или событий в реальном времени. Важным преимуществом AR является доступность: мобильные устройства делают эту технологию доступной для широкого использования как в школах, так и дома.

Web of Technology: Multidimensional Research Journal
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Ключевые слова: Виртуальная реальность (VR), 3D-эффект, дополненная реальность (AR), ИКТ, 3D-аудио, доле зрения (FOV), QR-код, 3D-модели, анимация, специализированные гарнитуры (такие как Oculus Rift или HTC Vive), специализированные гарнитуры (такие как Oculus Rift или HTC Vive), специализированные гарнитуры (такие как Oculus Rift или HTC Vive), AR-очки (такие как Microsoft HoloLens или Google Glass).

Introduction

Modern technologies are constantly changing approaches to learning, offering more interactive and engaging ways to transfer knowledge. Virtual reality (VR) and augmented reality (AR) are innovative technologies that are increasingly influencing the educational process, especially in the field of computer science.

Virtual reality (VR) allows for the creation of simulation of real-world tasks, such as modeling the work of operating systems, networks, or software.

Augmented reality (AR), in turn, can help students visualize abstract concepts and models, such as data structures, algorithms or computer network schemes, improving understanding and accelerating the learning process.

The use of VR and AR in computer science education opens up new possibilities for interaction with the learning material, increases student engagement, and improves the assimilation of complex theoretical concepts. Thanks to them, learning becomes more visual, interactive, and adaptive, making the learning process more interesting and effective.

This study will examine how virtual and augmented reality can be used in informatics training courses, what advantages they offer, and what challenges may arise when implementing them.

Virtual and augmented reality: key concepts and their differences. Virtual reality (VR) is a computer simulation of a three-dimensional environment with which users can interact and explore it, which seems real or physical, using specialized electronic equipment such as VR glasses (headpieces) and handheld controllers.

What is VR?

Virtual reality (VR) creates a simulated environment that can simulate real conditions or create fantastic, imaginary worlds. It allows users to immerse themselves in a digital space that seems realistic, enhancing the sense of presence in this environment. VR can be used for entertainment, education, training, healthcare, and various other purposes.

How does VR work?

VR headset (glasses): The main component of the VR system is the headset that closes the user's eyes. It displays two images (one for each eye) to create a stereoscopic 3D effect, forcing the brain to perceive depth and space in the virtual environment.

Motion tracking: VR systems use sensors to track the user's head movements, which allows the virtual environment to change depending on the user's movement, imitating natural sensations when viewing the real world.

Controllers and tactile effects: Users usually interact with virtual objects using portable controllers. These devices are often equipped with motion sensors and buttons that allow you to perform gestures, movements, and inputs that are reflected in the virtual environment. Some

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systems are also equipped with tactile sensors that provide tactile feedback through vibrations, which increases realism.
Real-time rendering: The virtual world is created in real time by powerful computers or game consoles. The environment is adapted to the actions and movements of the user, creating smoothness and interactivity.

Key VR characteristics:
Full immersion: VR is aimed at creating a sense of presence - a sense that you are completely immersed in the virtual world. The headphones and controllers are designed to isolate you from the physical world and move you into a computer-generated environment.
Interactivity: Users can interact with virtual objects and move around the environment using physical gestures and movements, making it very interactive.
Sensory input: VR systems involve many senses, including vision, sound, and sometimes touch (using tactile sensations). Some advanced systems may involve other senses, such as smell or taste, although they are less common.
Field of View (FOV): VR headsets often offer a wide field of view, usually between 100 and 110 degrees, creating panoramic sensations.
3D Audio: Many VR systems use spatial or 3D audio technology, allowing sounds to come from different directions, further enhancing the immersion experience.

Application areas of VR:
In education and training, it is used to model real scenarios for training in fields such as medicine, aviation, military affairs and engineering. In healthcare, it is used for therapy, anesthesia, treatment of mental illnesses and rehabilitation exercises. In architecture and design, it allows architects and designers to pass and study 3D models of buildings before their construction.
Overall, VR is a full immersion technology that uses hardware such as VR glasses and controllers, as well as complex software to create interactive and engaging experiences that simulate real or imagined environments.

Defining augmented reality (AR).
Augmented reality (AR) is a technology that imposes digital content - images, sounds, and other data - on the real world. Unlike virtual reality (VR), which immerses users in a completely virtual environment, AR expands the real world by adding digital elements to what the user sees using devices such as smartphones, tablets or special AR glasses.
What is AR?
Augmented reality (AR) combines the physical world with computer-generated content, enriching the real world by displaying digital information, objects, or effects over real scenes. It is widely used in various fields - from games and entertainment to navigation, education and industry.

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How does AR work?

Device camera: AR uses the camera of a mobile device (such as a smartphone or tablet) or AR-glasses to capture the real world. The device processes the image and uses it as a background or canvas for laying out digital elements.

Computer vision and tracking: AR systems use computer vision to recognize objects, surfaces, and surroundings. By analyzing the image from the camera, the AR software identifies specific markers (for example, a QR code) or understands the surrounding environment in order to properly place the digital content in the right place and orientation.

Applying digital content: After detecting the real environment, AR places digital objects - for example, 3D models, animation, text or images - on top of the real environment. These overlays are dynamic and can change as the user moves or interacts with the scene.

User Interaction: In some types of AR, users can interact with augmented content using gestures, touch screen or voice commands, which allows them to manipulate digital overlays or interact with them.

Key characteristics of AR:

Improving the real world: The main function of AR is to add or add digital elements, such as text, graphics or interactive objects, to the real world. This includes everything from navigation instructions displayed in the street view mode to digital characters appearing on the tabletop.

Availability:

AR is very accessible, as it can be used with widely used devices, such as smartphones and tablets, without the need to use specialized equipment, such as VR headsets.

Real-time interaction: AR responds to changes in the user's environment in real time. For example, in AR games such as Pokémon GO, digital beings move around in real environments while you are walking around.

Based on markers or without markers: Some AR systems use markers (definite images or codes) to trigger digital overlays, while others use marker-free AR, where digital content is placed using general information about the environment (for example, spatial mapping in mobile AR).

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