A Survey on Augmented Reality

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Abstract

Augmented Reality is a new direction of development of human-computer interaction technology. Article discusses the concept of augmented reality technology and current research, and discusses the enhanced reality technology research and Augmented Reality technology in the field of science and education as well as networking design and material.

Keywords

augmented reality, 3D registration, camera calibration.

1. Introduction

Since the emergence of augmented reality, more and more scholars into the augmented reality technology, based on research, and has published numerous papers, augmented reality technology as the digital world and the real world integration bridge for people with sensory experiences things around a new way. Augmented Reality is defined as: the virtual real-time digital information superimposed display to the real scene, and with the real object or user interaction to achieve natural human-computer interaction technology.

2. Research situation

Few universities and research institutions in our country to get involved in augmented reality technology, mainly Beijing Institute of Technology, Zhejiang University, University of Electronic Science and Technology. Augmented reality research institutions abroad more, for example, BMW laboratory, research and development are being assisted augmented reality car mechanical repair projects. Singapore MXR company, for the development of science and education in the field of product platforms and the combination of augmented reality exterior architectural design, the internal structure of the interactive display platform.

3. Augmented Reality System Characteristics

Augmented Reality system's main features are: (1) integration of real objects and virtual objects, (2) real-time interaction (3) three-dimensional registration. The purpose is the integration of augmented reality real scene and virtual objects, which need to meet the occlusion jitter or wander the virtual objects in the scene will not occur, but also properly handle the actual situation of the object; To have a realistic virtual objects, including its shape, realistic materials and textures; environmental lighting conditions and realities of virtual objects to be consistent. Study Augmented Reality technology include: 3D registration techniques, camera calibration technology, the camera tracking technology, the actual situation illumination consistency and real spatial modeling techniques.

4. 3D registration technology

3D registration technology that is displayed by the scene image or object can be tracked and located by calculating the correspondence between the virtual world and the real world coordinates, to achieve the virtual objects in the correct perspective spatial relationship to the reality scene superimposed to determine the location. There are currently tracking image recognition and object tracking based on motion-based sensor implemented in two ways.

3D registration based on image recognition technology is the use of optical cameras to identify image feature point extraction, or the depth of the camera for three-dimensional contours and identify objects from the real track. Both methods can be calculated in real time virtual and real correspondence between the world coordinate system, and the virtual object superimposed on the reality of the scene accurately in a plane identification mark or object.

Sensor-based three-dimensional registration techniques are by capturing the attitude and position of the camera or the object in real-time to accurately calculate the required number of superimposed virtual relative spatial position of the object. This high-precision motion capture sensor based on a three-dimensional space registration mode, due to restrictions from ambient light and more accurate for some of the more specialized augmented reality applications, such as wearing a display device with a combination of virtual simulation.

5. camera calibration technology

In augmented reality systems, the virtual and the real object or objects in the environment must be strictly aligned. When the user's viewing angle is changed, the parameters of the virtual camera and the parameters to be consistent with real cameras, at the same time, but also on the position and orientation parameters such as real objects in real-time tracking of the parameters are updated continuously. In the process of such a virtual alignment among the system such as internal parameters and their relative position and orientation parameters of the camera such devices remain unchanged, it is possible to measure these parameters in advance or calibration.

6. camera tracking technology

When the displacement of cameras and other input devices occurs in the scene, in order to set the correct camera parameters to draw the virtual object, to calculate its location information, resulting in the use of non-penetrating display device so that the virtual object imaged in the output device and input device to capture a scene consistent with, and in the use of transmissive display device so that the virtual object imaging and output device in the eye to see the scene consistent. In augmented reality, this process is called camera tracking technology.

7. Augmented Reality applications

(1) Digital Publishing

The augmented reality technology with traditional print, the 3D models, animations or videos superimposed on the print interaction with readers. The augmented reality technology and digital publishing platform combined rear camera using a handheld reading device that can achieve the 3D model or animation superimposed on the reader's reality environment and interact through the first viewing angle.

(2) Design

The use of augmented reality technology, can be implemented in the first perspective exhibition design work in real or simulated device in appearance, and human-computer interaction through the natural way with the virtual model is to assist industrial design, architectural design, and the new orientation of the device simulation..

(3) Science and Education

Augmented reality technology is courseware, support materials and technology demonstration of the new methods.

(4) Internet of Things

Internet of Things combination of augmented reality technology enables electronic tags will be positioned to enhance the realistic way, by mobile terminal digital information visualization management, to achieve the human and digital interactive mode between Internet of Things.

8. Conclusion

This paper describes the augmented reality technology research and application of key technologies and directions, it can be seen augmented reality technology from research to applications. With the continuous development of enhanced reality technology. In the near future, it is more natural interaction between people and computers.

Reference

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