QuickTime Virtual Reality Technology Applies to Practical Teaching Recording System

Yongyong Zhu[1,2]

[1]Civil and Commercial Law School, Southwest University of Political Science and Law, NO. 301, Baosheng Ave, Huixing Street, Yubei District, ChongQing, China, +8613883961106
2Department of economics and business administration, Chongqing University of Education, No.9 Xuefu Road, Sigongli, Nan'an District, Chongqing (Campus of CQUE), 400067, China, +8613883961106
e-mail: zhuyongyong@126.com

Abstract

The realization of virtual reality technology is useful in distributed practical teaching because its advantages such as illustrated, no limit by space and time, high intelligence, good ability of interactivity and etc. The practical teaching virtual reality technology is based on static images and IP network of computers. Recording the course of video, frequency, operation process of practical teaching, the contents of computer screen and etc simultaneously in real time, it broadcasts on internet, or save them on server in digital media format as internet teaching resources. It is the application of virtual reality technology to proceed with seamless data integration of various teaching platform, to form unified utilization and integration of resources, to improve the students' study interest, to promote the spreading and applying of virtual reality technology.

Keywords: QTVR, Virtual reality technology, Practical teaching recording system, IP network

1. Introduction

It is the record broadcast system real-time records and integrates the audio, video, picture signal of electronic equipments of practical teaching environment, to become the standard streaming media files for future public live broadcast, storage, later stage compilation and demanded broadcasting [1]. Student logins in records broadcast server through browser to watch live video, graphic and text information for study. It is through the establishment of visual virtual experiment environment to apply the QTVR virtual reality technology in practical teaching recorded broadcasting system [2]. Through the software, it simulates the operating principle, experimental procedure, operation process, experimental phenomenon, experimental results, data treating and etc of various equipments during practical training [3]. The students finish the virtual experiment by clicking the mouse and dragging movements in the remote client computer. It is the application and promotion of virtual reality technology to solve the interactive requests of contextualized learning interface and teaching contents of teaching process, to promote the application of information technology and creation of students' practical teaching method [4].

2. Virtual reality technology

The virtual reality makes the people to experience the virtual world naturally and interacting with virtual world through proper equipment as a participant [5]. Featured as its full ranges of perception, immersion, interaction, ideas and etc, the virtual reality technology emphasizes the human being's leading role in virtual system. Full ranges of perception means the virtual reality technology includes hearing, feel, touch, movement, taste, smell and etc perception to realize the full range reappear of real world. Immersion means the successful virtual reality technology allows the participants feels no difference between the virtual environment created by computers and real world. Interaction means participants interacting with virtual world created by computers which looks quite real. Idea means the participant feels the real environment in virtual world at the mean time visualize the things or scenes which may never happened in objective environment. The virtual reality technology helps to expand people's vision, imagination and cognitive range [6]. Since the virtual reality technology has

advantages such as low cost, high efficiency, multiple functions and etc, people realize the importance of applying the virtual reality technology on education filed [7]. The users could visit the virtualized system on internet through combining the software system and hardware system. In virtual experimental environment, it real-time emulates the experimental models through kinds of virtual experimental apparatus and instruments, etc. It simulates the teaching through stimulating the teaching environment. Based on this technology, the high schools and scientific research institutions propose the idea of virtual reality lab, which helps the users to be personally on the scene to observe the experiments on internet, to provide users the communication platforms of internet technology and research through images, audio, video, cartoons and etc technologies [8].

3. Quicktime virtual reality

As the short name of Quick Time Virtual Reality, QTVR is the technology expanding of Quick Time in Apple in USA. It is one kind virtual reality technology based on still images treatment and microcomputer platform. QTVR system includes creation software and play software. The creation software compound all discrete images into panoramic image, then turns panoramic image into QTVR format files [9]. QTVR includes the 3 core idea, panoramic images, object and scene. Panoramic images means when we treat one point in space as the center, any switchover angle in 360 degree of the center is reachable. It makes the distance shorter or longer to get different visual effects through changing viewing angles at a sight line. Object means viewing the objects through many viewpoints on 360 degree spherical surface of one center. It creates full range of image info of this object to from kinds of viewpoints for users' observation after treatment of QTVR software. Scene means connecting one or more panoramic picture or objects to form well-aligned aggregation [10].

Comparing with other objects generated from modeling, the image created by QTVR looks more real than the others. QTVR is capable of interacting. The user could finish the 3D modeling operation through mouse and key board. Users could roam panoramic picture and objects. The technology allows the participator to control the process and orders of experiencing. They are also allowed to choose the step they interested and skip the rests. QTVR is with good sense of immersion. It realizes the real-time modeling and dynamic display of complicated environment through image mosaic. It stimulates real 3D live scene through perspective images, which makes it high quality and perfect details showing [11]. With short production cycle and low cost, QTVR creates scenes quickly after collection, processing and rendering of real scenes. The shoots are faster than 3D production. As modeling of virtual reality technology based on processed static images, it realizes virtual reality experience without special hardware and accessory equipments which needed by traditional virtualization technology such as images work stations and etc. QTVR suits for releasing in kinds of format and data transmission because it is with small data size and good ability of interacting, good transmission ability and etc. QTVR is applied on photos, videos and digital images to create virtual environment and etc because of its unique technical features and advantages, to create new ways of connecting the media technology and simulation technology, to show broad prospects of Web virtualized labs.

4. Quicktime virtual reality technology applies to practical teaching recording system
4.1. Practical teaching recording system

On basement of computer networks, the practical teaching recording system real-time records all video, audio, operation process, content of the computer and etc. It is been saved on server in digital media as internet teaching materials. With high level system automation and integration, the recording system automatically matches kinds of input signals from teachers' audio and video, computer screen and etc. They are been efficiently converted to be on-line education courseware, to be real-time converted to be internet teaching resources. It is difficult for traditional classroom records to reappear multimedia courseware used in live classroom. The practical teaching recording system has advantages of both traditional courseware and classroom memoir. It shows the connection between knowledge in courseware through multimedia, shows the processes of teachers' explanation and guidance teaching. The practical teaching recording system is opening and capable of sharing. Based on digital internet teaching

resources created by internet recording system, it is capable of real-time playing video-on-demand on browsers after authorization. It reduces the possibilities of bad recording which cause by differences of software such as PC model, operation system, browsers and etc.

Practical teaching recorded broadcast system is formed by system front-end, the background, teaching database server and web client-side., System front-end is installed in recorded broadcast scene in multi-media classroom. Camera takes the teaching picture of the teachers and students. Through audio encoder and computer screen capture software, it finishes the acquisition and coding of video, audio, computer dynamic screen signal. Both the digital signal of video and audio signals of computers screens was been send to backstage of system for handling through transmission line. Connecting audio encoder and computer of leading-end, the system backstage is responsible for receiving and sending the dynamic video, audio, and computer screens. It also goes with many operations such as signal recording, broadcast, open switch, stop, preview and etc. According to the system management and maintaining instruction from server management side, it finishes the recording and live broadcasting of video, audio and dynamic computer screen [12]. Teaching database server maintains and manages the practical teaching courseware recorded and the click play customers on internet. Through the client-side software of system or browser, the internet client-side receives the live broadcasting from practical teaching system or click play the internet teaching courseware. The practical teaching recorded system construction, see figure 1.
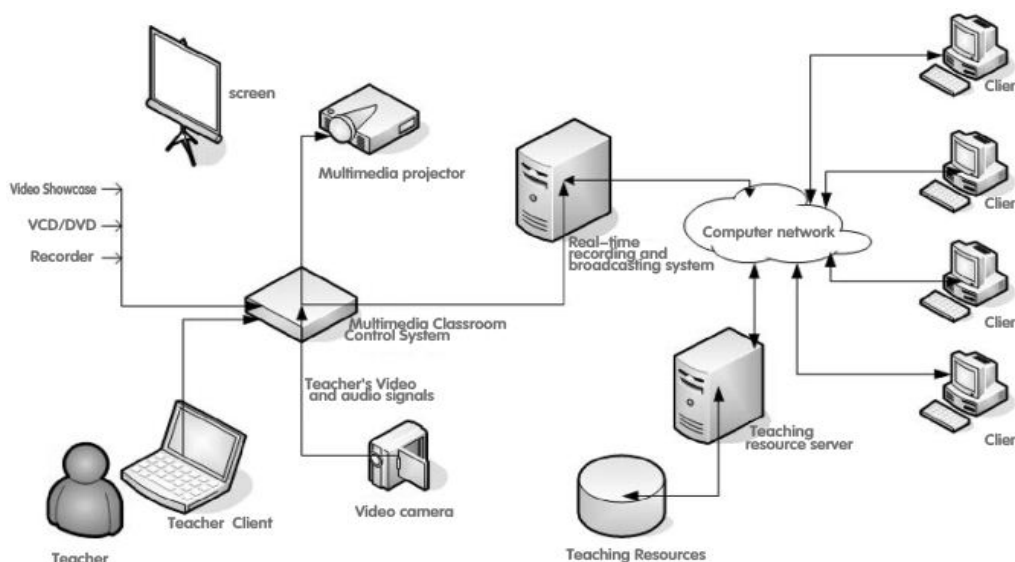

Figure 1. The Practical Teaching Recorded System Construction

4.2. QTVR technology apply into practical teaching recording system

QTVR virtual reality technology is applied on practical teaching recorded broadcast system. It is formed by Image acquisition equipment and software. Refers to the hardware part, the panorama camera is using ordinary camera and tripod. The tripod produced by a USA company KAIDAN has the consistent axis of ordinary camera. The software includes creation software and playback software. It is the function of the software to compound all discrete images into panoramic image, then turns panoramic image into QTVR format files. The professional QTVR creation software includes Apple QTVR Authoring Studio of Apple and Real VR Studio of Live Picture, which is only works with MAC platform of Apple. The VR ToolBox of Quick Time VR creation system belongs to VR Toolbox company in USA ， it produces QTVR professionally in windows. VR ToolBox includes 3 kinds of software named as VR Object Worx, VR Panoworx and VR Sceneworx. Through taking pictures of practical teaching process, the virtual reality production of QTVR handles the discrete images by using the software has the function of image stitching, creates virtualized reality scenes in panoramic view. Using high

resolution digital camera, it adopts the method of 360 degrees rotating shot of physical scenes. Adjacent images keep 30 degrees to 50 degrees of overlap while keeping shooting process uniformly. After shoot, it is been handle by seamless mosaic software and image processing software to get 360 degree panoramic virtual images [13]. The noise processing and motley color processing could be handled by Neat Image, DCEnhancer and etc software. The Photoshop could handle the problems such as image exposure, color balance, information changes and etc. QTVR has the advantages of Stereo space, three-dimensional object display, the builds-up and construction of virtual space, construction of virtualized scenes and etc, which can be wisely used in practical teaching recorded broadcasting system. It uses Cult 3D technology and 3Dmax to create virtual objects. It derives the Cd3 format files which supported by Cult 3D, then interactively design it in visual Cult 3D design environment [14].

Applying the QTVR virtual reality technology on practical teaching recording broadcast plays QTVR's advantages of switching sight, pushing & pulling the lens and hypermedia links, etc. Sight switching means you can view any observation point in 360 degrees surrounded way while the observer is been taken as the center in 3D place. It also means choosing any angle for observation in 3D 360 degree space while taking the 3D objects as its center [15]. Pushing & pulling the lens means when users observe something in one angle, he can enlarge or smaller the observation distance. Hypermedia link means smoothly handover the hypermedia link in 3D space and 3D subjects while putting you into the virtual space which with strong sense of reality. Hypermedia link is linkable to images, audio, video, text and etc media material. QTVR virtual reality technology into practice teaching and broadcasting system principle is to rely on the cameras capture the video signal, the mixer collection audio signal recording and broadcasting machine data compressed output, and then edit the formation of output information data can be exchanged and editing data information. The common hardware of QTVE practical teaching record broadcast system includes digital camera, a tripod, specialized holder, equatorial, glasses and etc. Filming the 360 degree spherical panorama needs high resolution digital camera because the stitching image is getting bigger while the higher resolution needed. Virtual panorama needs to constantly rotate the camera while filming. Therefore tripod with high quality and good stability would guarantee the camera being stable and less shaking. In order to avoid perspective distortion, we can only use front horizontal angle for filming virtual panorama, which needs professional holder and the tripod equipped with level measurement device. The rotatable platform is needed while producing the virtualization of physical entities. Equatorial telescope could equably turning films the big physical entities in the same horizontal plane, which helps to guarantee the quality of stitching images. Adjusting the focal length of glasses to be 6MM-16MM, it uses fish-eye lens to film, which leads to both the horizontal and vertical perspectives reaches 180 degree. The depth of field reaches infinity while it is farer than 1 meter, which shows deep perspective effects of objects.

The practice teaching recorded broadcasting system includes input part and output part. Input parts include audio, video and image information acquisition. The equipment includes microphone, camera, digital camera and a mixer [16]. The sound signal collection uses microphone MIC-IN or AUDIO-IN ports or mixer LINE-IN ports. The video signal is collected by record broadcast machine VIDEO or S-VIDEO which ports connect with camera. The digital camera films the still pictures signal. Continuous dynamic video can be divided into discrete image files, which been jointed together after filming through video camera. We could compound it through panoramic picture creation software if the final output is panoramic picture images. The output includes audio, computer screen, projection display screen and etc. After power amplifier treatment, the sound signal is output after being transferred to port of audio equipment. The picture signal and video signal is transferred to projector through VGA line out. Teachers could use multi-media terminal control teaching software to show the picture signal and video signal on students' computers' screens. After edition and treatment, the teaching recorded broadcasting file could be transferred into steaming media then to be uploaded on Web server as online live show and on-demand display files for students [17].

4.3. QTVR virtual reality technology Based on IP Network

QTVR virtual reality technology could be used on practical teaching real time recorded broadcast system which integrates audio, video and VGA on IP network. It uses DSP chip to go proceed with coding treatment of audio, video, VGA and recorded broadcasting of VGA hardware. It real-time records all activities of processes of practical teaching. Based on the

QTVR virtual reality technology application of IP network, the recording server finishes the acquisition and coding of video, audio, computer dynamic screen signal. It automatically changes over the video and computer screen through RS485 interface and center control system. It changes over the teacher scene and students' practical teaching scene through controlling the software. The recording server input port includes 2 video files, 3 audio files and one VGA interface. After connecting with camera, microphone and computers through ports to go proceed with live video and audio signals, dynamic computer screen gathering, they are been output as digital signals through encoder. TRS recording broadcast server is responsible for IP address management, coding agreement and band width setting of recording and broadcasting. According to the automatic control strategy of recorded broadcasting server, it automatically follows or automatically changing scenes on demands of different users. The output port is send to recorded broadcasting server through IP network. It helps to provide the live broadcasting or click play functions through managing and saving the streaming media from recorded broadcasting server. The QTVR virtual reality technology recorded broadcasting system based on IP network, see figure 2.
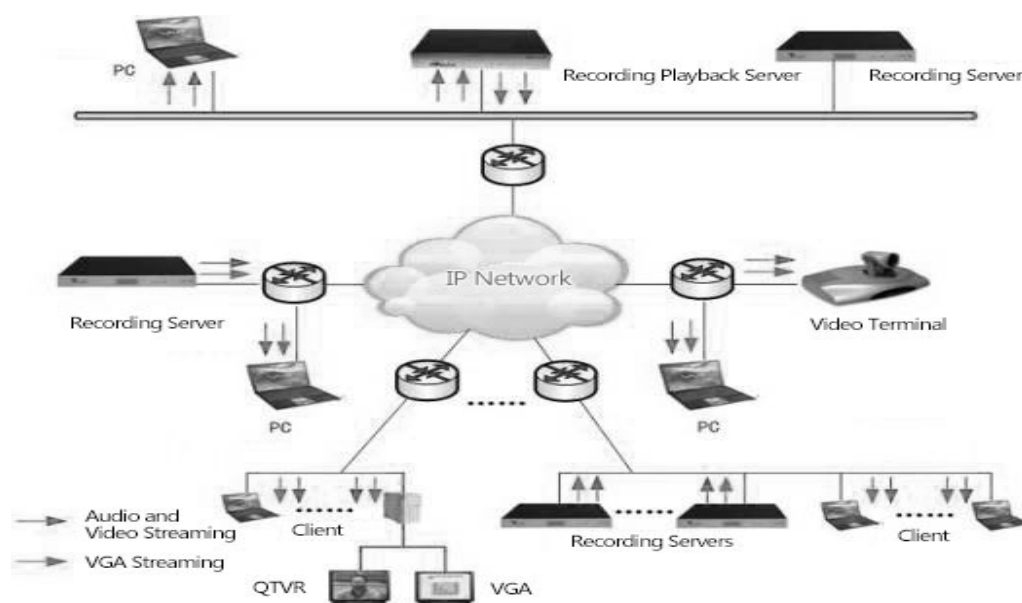

Figure 2. QTVR Virtual Reality Technology Recorded Broadcasting System Based on IP network

Based on QTVR virtual reality technology of IP network, the recorded broadcasting system inputs the simulated audio, video and VGA signals into broadcast server through direct hardware logging. The data and signal is turned into digital signals by recorded broadcast server. After that, it is been transferred to the terminals for playing on students' demands. The audio/video and the content of computer screen could be transferred through streaming media on IP network. We can play or replay it on demands through logging on web browser on PC. We can download the recorded contents of QTVR technology recording system through browser. The recorded broadcast system is saved in ASF streaming media video format. Through the built-in storage location of recorded broadcast system, the users could download the streaming media into PC through browser. Based on embedded operating system, it supports remote management based on WEB, supports real time recording & broadcasting and real time online playing. The system is stable and reliable while maintenance is simple. The recorded broadcasting system supports multichannel recording server. Users could use recording server or etc to produce audio , video and other data.，AVX recorded broadcast server of the system meets kinds of ITU standards such as H.261、H.263、H.263+、H.264 and etc. It guarantees the undistorted storage of recorded info by using undistorted digital recording technology.

4. Conclusion

The application of QTVR virtual technology effectively makes up its disadvantages of limited test site, short test time, shortage of test tools and delayed updating of test tools. It shows the abstract concepts and knowledge of practical teaching process by using virtual reality technology. Through the virtualized live operation, live simulation, live grading and live feedback, it improves students' ability to apply knowledge, to train their independent thinking, freedom, innovation and well rounded developments, which fully reflects the advantage of virtual reality teaching of low cost and high efficiency. The application of QTVR virtual technology in math helps students to quickly meet the requests from information society demand for applied talents, to promote teachers to change practical teaching concept and the way of practical teaching, to save the education investment, to improve teaching efficiency. It helps to improve students' study interest, to train their innovative spirit, innovative ability, creative thinking and collaboration awareness, to improve current practical teaching, to build foundation for flexible, convenient virtual experiment environments.The application of QTVR virtual technology in teaching refers professional knowledge, computer technology, art appreciation, creative thinking of students and etc. It shows the developer's comprehensive abilities. The research of QTVR virtual reality technology definitely will promote the spreading and application of virtual reality technology. It also promotes the developments of virtual labs which has the functions of intelligence, collaborative and real-time voice interaction and other functions in one.

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