Taylor & Francis
Taylor & Francis Group

Journal of Discrete Mathematical Sciences and Cryptography

ISSN: 0972-0529 (Print) 2169-0065 (Online) Journal homepage: https://www.tandfonline.com/loi/tdmc20

The innovation of college physical training based on computer virtual reality technology

Yanrong Yang

To cite this article: Yanrong Yang (2018) The innovation of college physical training based on computer virtual reality technology, Journal of Discrete Mathematical Sciences and Cryptography, 21:6, 1275-1280, DOI: 10.1080/09720529.2018.1526400

To link to this article: https://doi.org/10.1080/09720529.2018.1526400

Journal of Discrete Mathematical Sciences & Cryptography
ISSN 0972–0529 (Print), ISSN 2169–0065 (Online)
Vol. 21 (2018), No. 6, pp. 1275–1280
DOI : 10.1080/09720529.2018.1526400

Taylor & Francis
Taylor & Francis Group

The innovation of college physical training based on computer virtual reality technology

Yanrong Yang
Physical Education School
Henan Institute of Science and Technology
Xinxiang
China

Abstract

Computer virtual reality is a new technology appearing in recent years, which has been widely used in many fields. The combination of virtual reality technology and physical training in colleges can avoid sports injury, break restriction conditions and enhance teaching effectiveness. this paper analyses the key technologies applied in the physical training simulation system, including human modelling technology, data acquisition technology, scene design technology and system interaction technology. It also explores the innovative applications of the computer virtual reality technology applied in the sports items of football, aerobics and swimming, which can provide typical cases of the applications of virtual reality technology in college physical training for college teachers and students.

Keywords: *Virtual reality technology, VR, physical training, Physical education*

1. Introduction

Computer virtual reality technology is a computer application technology for simulating reality through the technology of realizing interactive sensing experience based on the full application of the sensor. The virtual reality technology system is constructed based on the five modules, which are respectively the testing module, the feedback module, the sensor module, the controller module and the 3D model module.

Through the construction of command information based on the testing module and feedback module and the transfer and control instructions by the sensor module and controller module, the system will eventually be connected to the real world and the virtual environment to achieve the 3D modelling module for efficient generation and use.

Computer virtual reality has three characteristics, namely, immersion, interactivity and perceived sharing. Through the careful analysis of five senses of human characteristics, the virtual reality system set up the 1:1 3D model equivalent to the real–world vision, which is more likely to experience personally on the scene. Virtual reality system breaks through the traditional interactive behaviour of computer control, and makes use of sensor to make virtual interaction, so it is more convenient to operate. It can also expand the

E–mail: yangyanrong88@163.com

imagination of the experiencer, and achieve the desired effect through the construction of the virtual world.

2. Advantages of virtual reality technology applied in college physical training

2.1. *Avoid sports injury*

How to prevent athletes from the difficult training, injuries has become the current sports organizations to solve the problem. The virtual reality technology can solve this problem well. Students without training, can complete the training and experimental tasks in the virtual environment. At the same time of controlling high difficulty action at the same time, it also ensures their safety in sports training, avoid high difficulty in the reality of the damage. In addition, the computer virtual reality technology can real–time found that students in training in action errors or skills shortage, to remind the correct and timely, let the students can get guidance, to speed up the learning efficiency. This is the virtual reality technology testing function of the embodiment.

2.2. *Break restriction conditions*

By using virtual reality technology, we can make the process of change of the object appear in an ideal way, and the time and space can be enlarged and reduced. Natural events can speed up or delay. Students can use equipment, space and even the weather into the classroom, to observe, study and realize the real experience of all kinds of motor skills will be able in the virtual environment, and tactical decision–making scheme, to feel the real operation. Teachers can quickly create the corresponding teaching scene, external environment, various characters and other teaching resources according to the needs of teaching in the virtual teaching, action difficulty and tactics and the real environment clearly show in front of students, so that more students can zero distance and angles of virtual practice. It makes students from the simple impression memory into visual memory and word memory combination, is conducive to students' correct understanding and grasp. When students practice alone, they can make repeated simulation training, which can greatly improve the teaching efficiency.

2.3. *Enhance teaching effectiveness*

Virtual reality technology has changed the characteristics of traditional sports teaching process. It transforms teachers from instructors of knowledge into instructors and organizers of teaching activities. Students change from passive recipients of knowledge to active inquiry finders of knowledge. The teaching media is changed from teacher's teaching aid and teaching tool into students' cognitive tools. Virtual reality can meet the humanistic ideal of educators. The creation of virtual environment provides a new platform for modern sports teaching. With the feedback of virtual environment stimulation has a strong impact force, can give students internal motivation and needs to have a strong sense of satisfaction, help to stimulate students' thinking and creative thinking, thus deepening the concept and construction of new ideas and creative.

3. Key Technologies of physical education simulation system based on virtual reality

The Key Technologies of physical education simulation system based on virtual reality mainly involves the Human modelling technology, the Data acquisition technology, the Scene design technology and the System interaction technology.

3.1. *Human modelling technology*

At present, human modelling technology in virtual reality sports simulation system usually refers to the modelling based on physical and physiological characteristics of human body. It refers to the physical characteristics of human body shape, structure, quality, sports ability and adaptability. The physiological characteristics includes the function index, blood pressure, vital capacity index and the new supersedes pulse such as human body and organs and systems.

3.2. *Data acquisition technology*

Motion capture technology uses the sensors to record real human movements in three–dimensional form. The computer drives the virtual people on the screen according to recorded data. The greatest advantage of this method is that it can capture the data of human real motion, as the generated motion is basically a copy of the human motion, so the effect is very realistic, and can generate many complex movements. The data acquisition of 3D motion data of athletes is mainly based on the active tracking method.

3.3. *Scene design technology*

There are many applications in virtual reality modelling software tools. CAD is a commonly used software in mechanical engineering. It draws the graph with very high accuracy, but its light rendering and animation function is very weak. There is a certain gap compared with 3dsmax. 3DS MAX has powerful animation settings, rendering, 3D modelling, material production, light setting and other functions. Compared with the same parts of its powerful modelling function, simple production process and other advantages. It has been the preferred tool for 3D scene modelling.

3.4. *System interaction technology*

Interactivity refers to the degree of synchronization of users in the simulated environment and how well they can get feedback from simulation training. This kind of human–computer interaction is mainly based on the 3D interaction technology of various special equipment, such as in soccer simulation training, athletes wear light clothing using stereo glasses, data, operation sensing gloves, athletes issued virtual equipment of various operating instructions. These devices can make real–time feedback

4. Innovation applications of virtual reality technology in college physical training

4.1. *Innovations of football training based on virtual reality technology*

We can create a vivid and stereoscopic training environment for trainees based on the virtual reality technology through the two–dimensional graphic base frame the corresponding simulation training environment, including training background, game scene, game device and related personnel.

The living lawn is designed by virtual system to enhance the spot penetration, to achieve the effect of simulation training and to improve the training quality. The proposed training field needs to be equipped with multi scale photos, omnidirectional images and data tracking to generate a high resolution three–dimensional terrain training area with almost the same three–dimensional environment to train football players.

4.2. *Innovations of aerobics training based on virtual reality technology*

In the control of hardware and software of computer simulation system, the competitive aerobics sports training in both the simulation scene, exercise equipment or action combination of clear picture display can make users feel personally on the scene. The software system of training and simulation reality technology is the core technology to implement and operation, both the simulation training virtual technology in which field, which are based on digital computer system and algorithm of. The realization of the simulation training function of competitive aerobics needs both computer and algorithm as hardware and software support.

4.3. *Innovations of swimming training based on virtual reality technology*

The computer virtual reality technology used in swimming teaching can accurately reproduce the multi angle swimming action of the subtle link through in a dynamic virtual swimming environment at presentation. According to the teachers' intentions, it can interact with the natural environment and the skills of learners, by contrast of the wrong actions and the intuitive real–time error correction. We combine modern information technology with swimming teaching, improve swimming teaching methods, optimize swimming teaching effect, improve students' learning interest and timeliness, and realize the innovation of swimming teaching.

5. Conclusions

The introduction of virtual reality technology in college physical education can improve the technical level of sports teaching and training, optimize training process and have a profound impact on the cultivation of the talents of innovation consciousness and innovation abilities.

References

[1] Chang C C, Jiang J P, Lan C H. Performance evaluation of home–stay management in Gu–Keng area, Yunlin country[J]. *Journal of Statistics & Management Systems*, 2009, 12(4):651–669.

[2] Ray A B, Deb S, Devi S. Creating an interaction interface to improve user engagement in virtual reality systems [J]. *Journal of statistics & management systems*, 2017, 20(4):593–600.

[3] Fisher A, Meisel S, Webb T, et al. Innerselfie: can we use Immersive Virtual Reality to change cancer risk perceptions and promote physical activity in young people? [J]. *Frontiers in Public Health*, 2015, 4(1): 1–1.

[4] Bordegoni M, Ferrise F. Designing interaction with consumer products in a multisensory virtual reality environment: this paper shows how Virtual Reality technology can be used instead of physical artifacts or mock–ups for the new product and evaluation of its usage[J]. *Virtual and Physical Prototyping*, 2013, 8(1): 51–64.

[5] Subramanian S K, Lourenço C B, Chilingaryan G, et al. Arm motor recovery using a virtual reality intervention in chronic stroke: randomized control trial[J]. *Neurorehabilitation and neural repair*, 2013, 27(1): 13–23.

[6] Yilmaz R M. Educational magic toys developed with augmented reality technology for early childhood education[J]. *Computers in Human Behavior*, 2016, 54: 240–248.

[7] Huang Y, Huang Q, Ali S, et al. Rehabilitation using virtual reality technology: a bibliometric analysis, 1996–2015[J]. *Scientometrics*, 2016, 109(3): 1547–1559.

[8] Loomis J M. Presence in virtual reality and everyday life: Immersion within a world of representation[J]. *PRESENCE: Teleoperators and Virtual Environments*, 2016, 25(2): 169–174.

[9] Bower M, Lee M J W, Dalgarno B. Collaborative learning across physical and virtual worlds: Factors supporting and constraining learners in a blended reality environment[J]. *British Journal of Educational Technology*, 2017, 48(2): 407–430.

[10] Molina K I, Ricci N A, de Moraes S A, et al. Virtual reality using games for improving physical functioning in older adults: a systematic review[J]. *Journal of neuroengineering and rehabilitation*, 2014, 11(1): 156.

[11] Fonseca D, Martí N, Redondo E, et al. Relationship between student profile, tool use, participation, and academic performance with the use of Augmented Reality technology for visualized architecture models[J]. *Computers in Human Behavior*, 2014, 31: 434–445.

[12] Hoffman H G, Meyer III W J, Ramirez M, et al. Feasibility of articulated arm mounted Oculus Rift Virtual Reality goggles for adjunctive pain control during occupational therapy in pediatric burn patients[J]. *Cyberpsychology, Behavior, and Social Networking*, 2014, 17(6): 397–401.

[13] Panigrahi S R, Jayaram S, Jayaram U, et al. Immersive 3D Visualization of the Collective Behavior of Particles and Crystal Dislocations Using Virtual Reality Technology[J]. *Modeling and Numerical Simulation of Material Science*, 2014, 4(03): 79.

[14] Gamito P, Oliveira J, Coelho C, et al. Cognitive training on stroke patients via virtual reality–based serious games[J]. *Disability and rehabilitation*, 2017, 39(4): 385–388.

[15] Dunsmoor J E, Ahs F, Zielinski D J, et al. Extinction in multiple virtual reality contexts diminishes fear reinstatement in humans[J]. *Neurobiology of learning and memory*, 2014, 113: 157–164.

Received March, 2018

Revised June, 2018