

Application of Motion Capture Technology in Power Safety Simulation Training

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Abstract: With the development of the national grid, the number of wires used to transmit electrical energy has been increased in which the power company arranges a large number of electricians for maintenance in ensuring the power output of the wires. However, excessive current is harmful to the human body and the safety training of electric power personnel is the top priority of electric power companies, with the development of technology, power companies can make use of the technology in the training of electric power personnel and the use of motion capture technology can make the training of electricians more realistic.

1. Introduction

The development of the national grid is inseparable from the efforts of the electric power personnel, but the electricians often have security incidents during operations. The safety awareness and power technology of electric power personnel is extremely important in the awareness of electric safety and the electric power personnel must carry out certain training and at the same time, you can use the motion capture technology for power safety simulation. In the simulation training, the electric power personnel can feel the importance of electric power safety more realistically, thereby, the safety skills of electricians can as well be increased through sports capture technology.

2. The principle of motion capture technology

Motion capture is a graphic that is obtained by computer and camera operations in which the camera sends the captured human body image to the computer and the computer records the image information in the motion track of the space and obtains the trajectory of the human body movement in different time by the algorithm of the computer. Therefore, motion capture technology can capture the movement of the human body through electromagnetic, optical and other means that is conducive to the simulation experiment^[1].

3. The significance of motion capture technology

In the power safety simulation training, the motion capture technology can not be directly used for the demonstration of physical objects in the safety training of electric power personnel. The motion capture technology can be used to simulate the electric power personnel to reduce the unnecessary danger in actual training and at the same time, it allows electric power personnel to deal with themselves when facing power safety. The motion capture technology can also simulate a specific power security environment and the captured camera puts the captured image into a specific environment allowing the electric power personnel to experience the danger of electric safety based on how to protect your personal safety and reduce losses when power personnel is encountered.

4. The technical key point of motion capture

Motion capture technology is a manifestation of a comprehensive technology and in this world of technology, the processing of computer images, the camera capture of the human body is the sensing technology, in other word, motion capture technology utilizes a computer generated 3D

feeling, making the human body feel like is in its actual reality. In the use of motion capture technology, when the position of the captured person moves, the captured image of the camera is transmitted back to the computer in real time and the computer also moves the image to a certain location through an internal algorithm, then the technology can effectively create a virtual environment in the computer allowing people to move freely in the virtual environment. However, in the use to get the state model of the human body it can improve the accuracy of the virtual environment.

5. Virtual scene construction of power safety simulation training

Motion capture technology is used in the power safety training system and in the traditional power safety training system, the main focus is on the theoretical knowledge. When they face power safety, the electric power personnel do not know how to protect themselves through the use of motion. Based on this fact, the electric trainers can actually feel the danger of power safety in virtual scenes and with the support of motion capture technology, the power safety training system is characterized by allowing electric trainers to more realistically access the current virtual scene and the key to building a virtual scene is the 3D graphics engine. Efficient virtual scene creation can be achieved with the OGRE engine and you can take advantage of the images of the additional features inside this engine and the image captured by the camera is processed and analyzed to realize the real simulation of power safety training ^[2].

6. The application of motion capture technology in power safety training

In order to be more realistic, the motion capture technology can be better played in power safety training, this is because when you place the motion capture camera in a position that captures the human body when in use and at the same time, the trainers of power simulation also wear some specific equipment so that the capture camera can capture the movement and the movement position of the power simulation trainer more accurately. This also helps the computer to accurately construct the shape of the power simulation trainer in the virtual scene and do a more realistic simulation.

6.1 Establishing a human body model

Power simulation trainers are required to wear specific equipment and perform specific actions when constructing a mannequin. Of course, human body models can also be constructed by artificial means and then when constructing the human body model, the human body can be edited with polygons after the human body model is constructed and the unsatisfactory places can be modified, in the process and applied to the 3dsMAX software because the 3dsMAX software is simpler than other software and is easy to work independently.

6.2 Positioning of the bones

After completing the basic mannequin construction, the special equipment worn by the power simulation trainer is used to determine the skeleton of the simulation trainer in preparation for the subsequent human movement and positional movement, because bones and mannequins are independent and you need to connect them together. In this way, the effect of the computer's linkage when the human body moves can be achieved and the human movement in motion capture technology is in the actual safety simulation training which the electric power personnel to be trained will perform certain walking and arm activities. In these activities, a capture camera is required to accurately capture the power simulation trainers' specialized equipment with electric simulation can improve the accuracy of the capture camera. When the human body moves around, the computer analyzes the image transmitted from the camera and finally, the actions of the trainers are synchronized in the virtual scene of the computer which allows power safety trainers to see their actions in the computer to further achieve the effects of simulation training.

6.3 Dyeing of motion capture technology in a virtual scene

The human body model can be dyed after the completion of the construction of the human body model. The resources within the 3dsMAX software are used in the dyeing of the human body model. There is an UA modifier inside the 3dsMAX software, this UA modifier can be used to edit the location of the mannequin motion capture technology which acts as a secondary positioning feature in the process. Thereby, the level of UA modifier processing technology is directly related to the final rendering with motion capture technology which is also the requirements of processing technology that can be reduced and it is also convenient for people to use. After the UV processing of the 3dsMAX software is completed, the final processing is performed by Photoshop software. Notwithstanding, it is also possible to select a photo of the power simulation trainer during the processing of the Photoshop software, or to use a photo of the motion capture camera. After the Photoshop software is processed, it can be displayed by the computer and the power simulation training in other for the human body to see the performance of the simulation training on the computer^[3].

7. The main points of motion capture technology simulation:

Power construction personnel some time faces various difficulties in construction which requires simulation training to help electricians learn how to solve problems when using the motion capture technology to carry out natural disasters for electric power personnel. It is necessary to set the parameters of the motion capture technology to model and set the calculations for various natural disasters so that the motion capture technology can capture the human body model more accurately. In the simulation training of human factors, various typical security risks should be simulated and the safety precautions of scientific standards are formulated. In the simulation training, the motion capture technology can make certain modifications to the safety hazards so as to adapt to the electric power construction personnel with different capabilities and at a growing number of power grids, that various emergencies also occur from time to time. Therefore, there will be emergency simulation training for emergencies in security simulation. The motion capture technique can be set according to the simulated environment during training, it is most likely to cause a chain reaction in an emergency which requires the motion capture technique to set the chain reaction. At the same time, it can also simulate the scene when the construction environment in the field encounters safety problems so that the electric power construction workers who are conducive to field operations have certain reactions when they encounter problems. This is also conducive to the rapid elimination of field safety faults to ensure the stable output of electricity, but also to the safety of field construction personnel^[4].

8. Conclusion

In the training of power safety simulation using motion capture technology, simulation training can be free from time constraints which enables trainers to achieve familiarity with electrical safety standards through continuous practice. Trainers can improve the effectiveness of training through mannequins in virtual scenes, the training in power simulation and in a virtual scenario can also reduce the cost of the training for the company, while reducing the time for the trainer through the development of motion capture technology will develop rapidly in other fields in the future.

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