



# Research on Web3D Interactive System of College Sports Martial Arts

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**Abstract.** At present, in the design of remote interactive teaching system of sports martial arts in colleges and universities, due to the lack of effective analysis of the user's requirements and the system's function, the system's response speed is too slow. Aiming at the problems of time delay and low CPU utilization in network teaching, this paper proposes a remote interactive teaching system of college sports wushu based on Web3D technology. Through the user requirements and the function of the system analysis, on the basis of the analysis, select the suitable application program, the function design of the system, and complete the overall design; On this basis, the use of Web3D technology, improve the learning efficiency of students [1], and on this basis, design a set of effective sports wushu remote interactive teaching system. The experimental results show that the system response time, video transmission delay [2], CPU usage and other tests all prove that the system has high scalability and feasibility [3].

**Keywords:** Web3D technology · Remote interactive teaching · College sports wushu · System design

## 1 Introduction

In the past few years, physical education has been neglected in teaching, while modern physical education has been introduced into physical education because of its own characteristics. With the rapid development of network information technology, modern wushu teaching can be carried out by using network technology to realize resource sharing and improve teaching quality.

WANG et al. [4] collected data, designed programmable interconnected resources, and used digital lines to transmit teaching videos. However, due to poor real-time performance, the teaching videos were delayed. YANG et al. [5] introduced Microsoft Kinect and realized a bone-based framework for understanding human movement through COVRS. See Formula 1 for specific calculation

$$\boxed{a^2 = b^2 + c^2} = \ddot{a} \quad (1)$$

The quality is clustered for different human behavior and the CPU usage is low at run time.

Aiming at the above problems, a remote interactive teaching system of college sports martial arts based on Web3D technology is proposed.



Fig. 1. Teacher service sequence diagram

## 2 Based on the Role Analysis and Information Management of College Sports Wushu System

### 2.1 System User Information Analysis

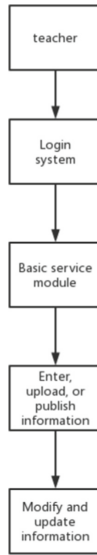
According to the characteristics of the interactive network technology of sports martial arts in colleges and universities, this paper proposes a remote sports interactive teaching system based on 3D network technology. In the online interactive teaching of sports martial arts in colleges and universities, teachers with three-dimensional network technology as the core play a key role [6]. Among them, the main function of the teacher operation module is to update the teaching content in real time [7], upload, upload, upload various teaching videos and so on. The teaching operation module also has the functions of adding and deleting, which can be hidden in the query box for the convenience of users [8]. The detailed operation process is shown in Fig. 1 [9].

Many business operations of teachers, students and administrators in the whole system are interrelated and have independent requirements for various functions [10]. As shown in Fig. 2/3:

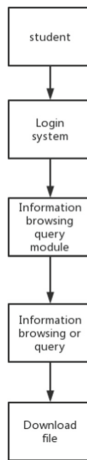
### 2.2 System Function Analysis

The remote interactive teaching of college sports martial arts based on Web3D technology is a new way of online education.

The materials of teachers are analyzed. This system is responsible for the comprehensive management of teachers' personal information, curriculum resources and teaching information. According to the course content, build an interactive communication platform for students and students. Teachers can also arrange homework and videos for students to review. The management of electronic whiteboard. Its main function is to enable users to read information and discuss various issues through the Internet. On the

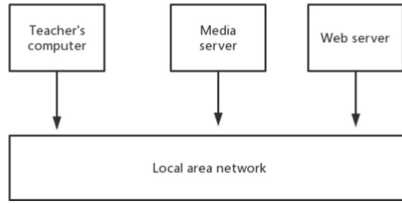


**Fig. 2.** Student business timing diagram



**Fig. 3.** Administrator business sequence diagram

electronic whiteboard, students are free to ask questions or talk to each other about their problems, while teachers also answer questions.



**Fig. 4.** Detailed framework

## 3 System Design

### 3.1 Overall System Design

The network interactive network technology is the network interactive network education based on the network technology, so the system has the general flow network system architecture. On this basis, RTMP Instant Message transfer protocol (FMS) and Web server (Web server) are used to achieve audio and image transmission. The client includes both the teacher and the student. The detailed framework is shown in Fig. 4.

- (1) Client. In this system, users can deal with the system according to their own needs. When users use the virtual classroom, certain authorization will be given to users according to their identity. Teachers can send real-time audio and video information to students, and communicate and discuss with students. Students in question can “raise their hands”, and those in violation can use IP (Internet) to block the class; Students have the right to receive audio and video messages sent by the instructor to the server, to answer questions online and to communicate with classmates.
- (2) Server side. The streaming media service of FMS can transmit RTMP protocol to customers in video format, which facilitates users’ real-time browsing. The FMS streaming server can handle many simultaneous connections, but very few for the client. At the same time, the network server can also provide file and network services on the client according to the requirements of the client.

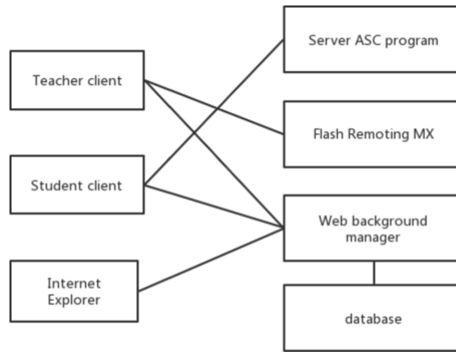
### 3.2 System Module Design Based on Web3D Technology

In the interactive teaching of sports wushu in colleges and universities, B/S (Browser/Server) architecture is generally adopted, and the client is managed by Browser/Server of IE. Using the HTTP (Hypertexttransferprotocol) based interactive education. As shown in Fig. 5:

The scheme, as shown in Fig. 5, can be broadly divided into three categories. It implements the role management module, teaching resource generation module, virtual course module and resource upload/download module.

1) Users in the system mainly include students, teachers, system administrators, etc. After the user logs in, the user will be assigned the corresponding permission according to the user name and password. The following is a detailed description of each person.

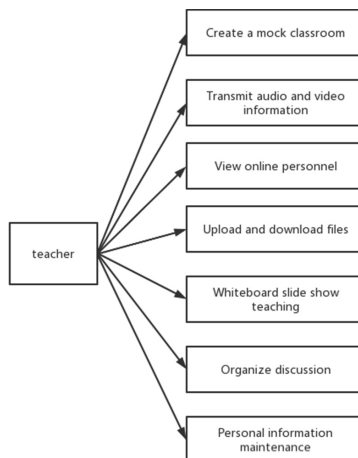
- (1) The role of teachers; If the user logs in the system as a teacher, the user can obtain the authorization of the teacher, so as to realize the creation of virtual classroom.



**Fig. 5.** Total model of distance teaching system

After the implementation of the system is completed, the virtual classroom can be used for related teaching, effective management of the entire virtual classroom, and has the functions of receiving audio and video, real-time monitoring of students and so on. As shown in Fig. 6:

- (2) The role of students. After getting the authorization, students can choose the corresponding virtual classroom to attend lectures or participate in other teaching activities according to their own needs. The specific functions are shown in Fig. 7.
- (3) Administrator role. The administrator is the maintainer and manager of the whole system, whose specific work is to manage users and servers, and to deploy teaching tasks, as shown in Fig. 8.



**Fig. 6.** Teacher function module diagram

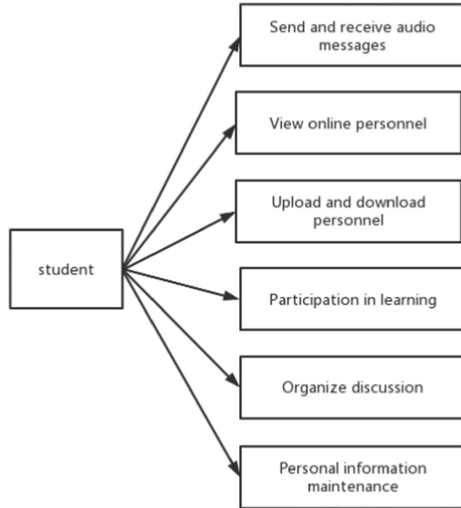


Fig. 7. Student function module diagram

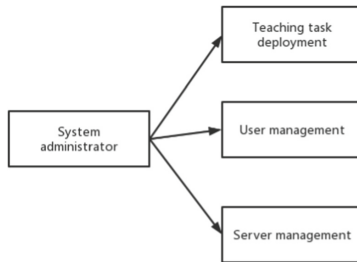


Fig. 8. Administrator function module diagram

2) After obtaining authorization, teachers can use the teaching resources generated by the course. At present, most multimedia courseware is realized by Flash& Java and JavaScript technology, but in 3D courseware, only interactive 3D courseware, which can make the knowledge in the classroom more intuitive presentation. Network 3D technology is used to produce teaching courseware, and “3D + VR + 3W” (3D + virtual reality + WorldWideWeb) three combination technologies are used to achieve 3D modeling, virtualization, web page production and other functions, and realize the production of multimedia courseware. The multimedia courseware is presented in the teaching system in a three-dimensional way, so that students can have a better remote interaction.

#### 4 Conclusion

Nowadays, people pay more and more attention to wushu culture, and adopt the traditional design of “interactive teaching system”, the system response time is long, the system transmission teaching delay is high, the utilization rate of CPU resources is not

high. Combined with the above problems, this paper puts forward a scheme of network interactive teaching platform of college sports martial arts based on three-dimensional network technology, and combined with the actual needs of students and the characteristics of the system, carried out a comprehensive functional design, combined with the overall framework, platform and module specific design, in order to achieve the purpose of long-distance interactive teaching of college sports martial arts.

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