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Project-driven Multimedia Communication Course Teaching

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***Abstract*—Multimedia communication has strong theoretical, professional and practical characteristics. Traditional knowledge-driven teaching method can't fully mobilize the enthusiasm of students to learn, and can't meet the needs of applied talents training. Combining with the characteristics of the course, the project-driven teaching method is introduced into the course teaching. Taking "Video on Demand System Design" as a special topic, students can better understand the key technologies, principles and applications of multimedia communication, stimulate students' subjective initiative in learning, and improve students' engineering practice ability.**

Keywords—project-driven; high education; multimedia communication

I. INTRODUCTION

With the continuous development of communication technology, multimedia communication systems have been widely used in various fields. New standards such as 4G and 5G mobile networks have also brought about many applications, such as tripartite services of mobile networks, videophone, video conferencing, streaming media on demand, navigation services, distance education, telemedicine, etc.

Multimedia communication course is the core course of electronic information specialty. It has a complete theoretical system. It is a course that combines theory with practice and pays equal attention to principle and application. Its teaching goal and task is to train students to master the principles and key technologies of multimedia communication system on the basis of understanding the basic concepts and principles, and lay the necessary theoretical and practical foundation for graduation design. The traditional knowledge-driven teaching method mainly relies on teachers to use modern multimedia technology to "fill the classroom" to teach, which has the following shortcomings: (1) Strong theory, cramming teaching can't mobilize students' enthusiasm; (2) Focusing on theoretical principle teaching, ignoring the connection and application with engineering practice; (3) Concept, origin. The links of theory, arithmetic, programming and image problem solving are disconnected, so students can't define the learning purpose; (4) Knowledge points are abstract and scattered, and students can't grasp the connection of knowledge and the main line of learning. In order to cultivate innovative and applied talents in an all-round way, the project-driven teaching method is introduced into the multimedia communication course, with the technical route of specific projects as the main line of learning, aiming at improving students' engineering application ability.

II. PROJECT-DRIVEN TEACHING METHOD

The document "Several Opinions on Improving the Quality of Higher Education in an All-round Way" issued by the Ministry of Education of China points out that "colleges and universities should strengthen the link of practical education, and the additional teaching funds should be given priority to practical teaching". Project-driven teaching method is one of the effective ways to improve students' practical ability. It is a teaching method based on constructivist learning theory, and it is also a teaching mode advocated by CDIO concept. Unlike traditional teaching methods, project-driven teaching method integrates basic knowledge into practical projects, specializes in curriculum content, improves students' understanding and absorptive ability of theoretical knowledge through project tasks and specific practices, and enables students to devote themselves wholeheartedly to the exploratory situation of knowledge, giving full play to students' mastery of learning. Motivation, collaboration and creativity can better serve market demand and social development.

Project-driven teaching method is a student-centered and teacher-centered teaching method. Through the encouragement and guidance of teachers, the emphasis is placed on the coordinated development of individuals and teams in the process of highlighting students' specific practice.

III. MULTIMEDIA COMMUNICATION

Multimedia communication refers to a kind of meeting or communication between participants in different geographical locations. It transmits compressed digital images and sound signals through LAN, WAN, Intranet, Internet or telephone network. It is a collection of multi-media information (such as data, text, voice, graphics, images, etc.).) It integrates the functions of transmission, display, storage and reproduction. Comparing with traditional single media communication methods such as telephone, telegraph, fax and computer communication, using multimedia communication, users who are thousands of miles apart can not only exchange information in audio-visual pictures and texts, but also present multimedia information in different places step by step as a

complete information in front of users. And the user has complete interactive control ability to the whole process of communication.

Multimedia communication technology is a cross-disciplinary technology. It involves many key technologies, including multimedia data compression technology, terminal technology, multimedia database and retrieval technology.

A. Multimedia Information Processing Technology

At present, the most critical technology in multimedia information compression is audio/video compression coding technology. Generally speaking, multimedia information has a large amount of information, especially video information. Without compression, the transmission rate of multimedia information can be about 140 Mb/s, while HDTV can be as high as 1000 Mb/s. In order to save bandwidth and allow more multimedia information to be transmitted over the network, it is necessary to compress video information efficiently.

After years of efforts, video compression technology has gradually matured, and a series of international standards for video compression have emerged, such as H.261, H.263, MPEG-1, MPEG-2, MPEG-4, and MPEG-7. Even for HDTV, the compressed rate is only 20 Mb/s. As for videophone, when it is transmitted on PSTN, it can be compressed to about 20 kb/s. The compression technology of speech signal has also been greatly developed. If the rate of 64 kb/s is not compressed, the compression rate can be reduced to 32 kb/s, 16 kb/s, 8 kb/s or even 5-6 kb/s. In order to improve channel utilization, video and audio compression coding is the first multi-media source coding technology to be solved.

B. Network Technology of Multimedia Communication

The network technology of multimedia communication includes broadband network technology and access network technology. In the multimedia communication system, the transmission on the network is a complex data stream which is synthesized by various media. It requires not only the high-speed transmission capability of the network for information, but also the high-efficiency synthesis capability of the network for various information. At present, B-ISDN with ATM technology as its core is the ideal network for multimedia communication. However, from the perspective of the development trend of network, the realization of multimedia communication on IP network is the main goal of all countries in the world. However, the characteristics of IP network, such as bandwidth control, delay guarantee and quality of service guarantee, are not conducive to multimedia. The development of communication business, therefore, must solve these related problems.

In order to realize the reliable transmission of multimedia information and the popularization of multimedia communication technology, multimedia communication terminal equipment must be made into small, reliable and low-cost products, so VLSI (Large Scale Integrated Circuit) and EDA (Electronic Design Automation) technology are also indispensable.

C. Terminal Technology for Multimedia Communication

Multimedia communication terminal is a communication terminal which can integrate multiple media information, synchronize multimedia information and have interactive function. It must accomplish many functions such as information acquisition, processing, synchronization and display, which involve signal processing and recognition technology, source coding technology (including the compression technology mentioned above), and channel coding technology (including baseband transmission technology, frequency band) for effective transmission. Transmission technology, error correction technology, etc.

D. Multimedia Database Technology

The database refers to a controllable data set related to an entity, while the database management system (DBMS) is composed of related data and a set of software accessing the database. It is responsible for the definition, generation, storage, access, management, query and representation of information in the database. Traditional DBMS mainly deals with characters and numbers. Traditional database management system is very successful in dealing with structured data, text and numerical information.

However, with the development of technology and the emergence of a large number of unstructured data (such as graphics, images and sounds), the traditional database information system is not competent. Therefore, it is necessary to study and establish a new type of database, multimedia database, which can deal with unstructured data. Multimedia database management system (MMDBMS) should not only improve the functions of traditional database management system, but also add some new functions.

The basic technologies of multimedia database mainly include: multimedia data modeling, data compression/reduction technology, access management and access methods, user interface technology and distributed technology, etc. In order to adapt to the development and application of technology, MMDBMS should have an open architecture and a certain degree of scalability. At the same time, MMDBMS also needs to meet the following requirements: the ability of traditional database management system; the ability of super-large capacity storage management; the ability to query and retrieve multimedia information; and the convenience of media. Integration and editing of entities; multimedia interface and interaction functions; can provide a unified performance management mechanism to ensure its service performance.

IV. Application of Project-driven Method in Multimedia Communication Teaching

The key of project-driven teaching method is to formulate and select appropriate practical projects

according to students' existing knowledge, abilities and interests. With "Wi-Fi-based Visual VoIP Mobile Interphone System" as the specific practice project, through the project promotion process specialization, with the continuous promotion of practical projects, the course content layer by layer in-depth, so that students naturally learn new knowledge, and carry out the ability to discover and solve problems.

VoIP (Voice over Internet Protocol) is simply to digitize analog signals and transmit them in real time on IP network in the form of data Packet. The biggest advantage of VoIP is that it can widely use Internet and global IP interconnection environment to provide more and better services than traditional services. VoIP technology has been widely used in computers, but also a large number of applications based on VoIP. With the convenient access of mobile terminals to WLAN, similar software has been developed on mobile terminals, such as Tencent QQ, WeChat, Apple Facetime and so on.

The research goal of this design is to realize a free mobile terminal visual VoIP Mobile Phone Intercom System in campus (LAN). The system can be adapted to Android operating system and various smart mobile terminals.

The system uses WLAN to access the network, establishes a session through SIP protocol, transmits voice and video data in the form of IP packet, and realizes a real-time voice and video communication system.

At the beginning of the semester, we divided the students into four groups in the form of free combination. Each group completed the design of one or two modules of the system, under the guidance of the teacher in charge.

(1) Design the overall scheme of the system, study its feasibility and demonstrate its feasibility;

(2) Build the C/S model in system development, study Open SIPS software and build the environment needed for system development. The server side is mainly the installation and configuration of SIP server. The client (mobile terminal) will involve the core knowledge of multimedia technology and network programming in Android mobile operating system. It is necessary to systematically learn and master Android mobile operating system and network programming technology.

(3) Transplantation and compatibility of voice libraries, conversion of video formats and multi-threading processing will be the core of this research. At present, the main audio formats supported by the mainstream Android operating system are AAC, MP3, and MIDI and so on. The main video formats are H.263, H.264AVC and MPEG-4SP. At the same time, choosing which standard to use for encoding and decoding is also a problem that should be carefully considered and concerned in the system.

(4) Develop the client software of visual VoIP mobile interphone system in Windows+Eclipse+Android-SDK-Windows development environment, and configure the server to run well. Finally, the client software is transplanted to the mobile phone for repeated debugging and verification.

V. PROJECT CLOSURE AND ACCEPTANCE

The module is designed and implemented in groups, using a comprehensive and open multi-index evaluation system, which includes 50% normal performance (including personal attendance and classroom operation)+10% team curriculum design documents+20% report and reply+10% team members' mutual evaluation+10% team creativity. This system not only cultivates students' self-actuality. Practical ability also strengthens teamwork and innovative personality development.

In order to strengthen the training of applied talents, the project-driven teaching method is introduced into the course of Multimedia Communication, which is an extension of the traditional teaching concept and a practical reform of teaching methods. Under this mode, students can not only learn the key technology of multimedia communication, but also mobilize their enthusiasm, initiative and innovation in learning, so that they can analyze the system according to the actual needs, and cultivate the applied and comprehensive abilities of raising, analyzing and solving problems.

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