

Implementation of Virtual Video Camera Integrable Ware System

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Abstract—For the shortcomings of integrity, fixity and closed of traditional courseware, for the purpose of improve the reuse, versatility and openness of courseware, this paper use Flash ActionScript 3.0 technology, develop a set of generic courseware integrableware system, and base on the system construct a intelligent, high degree of simulation of the virtual video camera system. The virtual video camera system has the functions of record, zoom and play, and virtual the advance features such as zebra pattern, white balance, etc. It represents the development direction of intelligent simulation and integrableware applications.

Keywords- Courseware, integrableware, camera, intelligent, simulation

I. INTRODUCTION

With the development of multimedia courseware developing to the intelligent, virtualized features, The courseware production software is not uniform, so it require teachers to have mastered computer program knowledge. An excellent courseware not only requires developers have high level of software development technology, but also master a solid knowledge of instructional design theory. However, in reality, the front-line teachers or courseware developers are often difficult to have these two conditions at the same time. The traditional courseware not only require a long cycle of development, the high cost, poor reuse rate is low, versatility, flexibility, neither conducive to the use of the user, is not conducive to the maintenance and management. Its drawbacks of integrity, fixity and closed, is not convenient for teachers at any time, any place to individualized teaching, so it restrict the individuality and creative development of teachers and students, and not suit for the need of classroom teaching. This paper states that courseware development facing "courseware crisis".

Integrableware is a program of solving the problems of "courseware crisis". The concept of Integrableware is advanced by JiaHou-Li profession, but these years the development of integrable systems is slow, on the one hand, integrable systems are difficult to develop, on the other hand for teachers' conception of courseware are not transform to integrableware. Most of the teachers do not want to spend much time to develop the integrableware, and few programmer who had developed the integrableware systems but unwilling to share with others. There are hardly any integrableware systems at present, most of the systems are the gather of teaching resource. The functions are simple and Lack of interaction, let alone virtual or intelligent effect. Some of the systems is similar to the template, but modify the template require the modify the code, so require the

teachers have to master the technology of software program, it is tedious and not easy to promote and popular.

II. INTEGRABLEWARE

A. Concept of integrableware

Integrableware is completely an open software system, is the second generation teaching software following after the first generation teaching software. It is not a simple superposition of teaching resource library and multimedia authoring tool, but a platform for the teachers and students of using teaching information and teaching processing strategies of information and teaching strategies library by their own needs. EASE OF USE

B. Characteristics of integrableware

- **Primitives:** Integrableware materials are based on knowledge as basic element, every knowledge is a primitive module, have the functions of classification, search and building, teachers can easily organize multimedia information resources.
- **Integrability:** The knowledge primitives of integrableware can be reorganized, accumulated and transformed flexibly by the needs of the teachers and students.
- **Versatility:** Integrableware can be used for all ordinary teachers, regardless of transformation of the curriculum system, the textbook version, the primitives information can be selected, composited and applied in actual teaching activities by different teachers.
- **Openness:** It's no need to master programming knowledge to use integrableware, the integrableware materials can be reorganized by teachers by primitives format. Therefore, teachers and students can add the new information and their own works to the data library, so can be shared and used by others.

III. DESIGN IDEAS OF THE SYSTEM

Contrary to the holistic, fixed and closed drawbacks of traditional courseware, the system use the integrableware developing idea, building a cameral teaching system base on the integrableware system architecture, and achieve the functions of virtual simulation and intelligent evaluation. So as to reduce the cycle and cost of courseware development, improve the efficiency, reuse and versatility of courseware development.

A. Architecture of integrableware

The integrableware platform of this system is composed of material integrableware library, SWC module integrableware, FLA code integrableware; MovieClip integrableware and SWF file integrableware. We develop the application architecture base on these integrableware, then modify, integrate and improve the architecture to perfect functions.

B. Virtual simulation

The system virtual the functions of cameral, include record, zoom and play the videotape operation, and manual setting functions such as focus, zoom, exposure, depth of field, shutter speed, aperture, AE, zebra pattern, white balance, ND filter, and the realistic video effects. We use 3D MAX modeled on the real picture of the part of the material modeling, rendering and output, and then import them into Flash using animation techniques to generate a virtual simulation animation. The interaction function is implemented by the object-oriented language ActionScript 3.0 programming technology.

C. Intelligent evaluation

The intelligent evaluation function is reflected in experimental apparatus, experimental operation, data acquisition experimental results, etc. In this system, students can change the system data by random and dynamically, and the system can judge, feedback, and correct the different operation of the students base on the input data, then make a correct reasonable evaluation intelligently.

IV. THE DEVELOPING ARCHITECTURE OF INTEGRABLEWARE BUILDING

There are five types of integrableware platforms of this system shown as following Fig. 1: material integrableware library, SWC module integrableware, Class code integrableware, MovieClip integrableware and SWF file integrableware, which is shown as follow Fig.1:

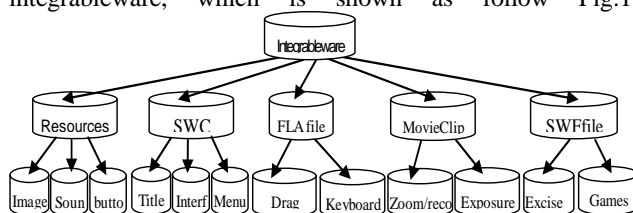


Figure 1. The integrableware platform.

A. Architecture of integrableware

Mainly include the images, sounds, videos and buttons in the library and public library. The symbol of Flash is a object-oriented class, the reuse of instance will not increase the capacity of the file, so transform the resources into symbols will significant savings in storage space. Using the instances in the scene, we can change the color, alpha, and size of it, and the same symbol may have different attributes of instances, different instances can add different actions.

B. SWC module integrableware

The SWC module integrableware is the custom modules of make the common functions of navigation, menu, interface and title to custom modules. We make the change part of functions to a set of dynamic text or variable, when applied to the scene; we can change the attribute and assignment the variable and dynamic of the module, then produce the final documents. The advantage of the SWC module integrableware is make the interfaces and menus integrated, improve development efficiency.

C. MovieClip integrableware

The common functions of cameral such as focus, zoon, record, exposure, depth of field, shutter and aperture coefficient can be made into MovieClip integrableware, these functions are often used in cameral operation. The advantage of MovieClip is which can be copied for any times, and we can change the attribute and images resources once for all.

D. Class integrableware

A class is a template definition of the method s and variable s in a particular kind of object. Thus, an object is a specific instance of a class; it contains real values instead of variables. A class can have subclasses that can inherit all or some of the characteristics of the class. Subclasses can also define their own methods and variables that are not part of their super class. Some importance or common used functions can be programmed to external Class integrableware, when building the system; we can link the MovieClips or buttons to the external Class to realize the functions quickly.

E. SWF integrableware

The SWF integrablewares are often used in excises modules. The idea is separate the content of the excises from the file code, use the functions of LoadVariables() to load the text file or XML file to the system, the advantage is we can input, edit or modify the excise content easily, and do not need to change the code

V. THE DEVELOPING ARCHITECTURE OF INTEGRABLEWARE BUILDING

A. The application architecture

The application architecture is built upon the integrableware in front, after building we make some modification and reorganize, then use LoadMovie() functions to link all the module to the system, let's make a detail description of the implementation of the professional functions of video cameral. The mainframe is shown as follow Fig.2.

B. Record and zoom

As Fig.3 showing, Record and zoom are the basic functions of cameral, the system simulate three different modes of record and zoom functions. We make the record and zoom functions into a integrableware, then copy and modify the integrableware in realize the three methods of record and

zoom function. The application principle is to change the zoom multiple, for example, the zoom multiple $s=1.2$ is quick zoom, the zoom multiple $s=1.05$ is slow zoom.

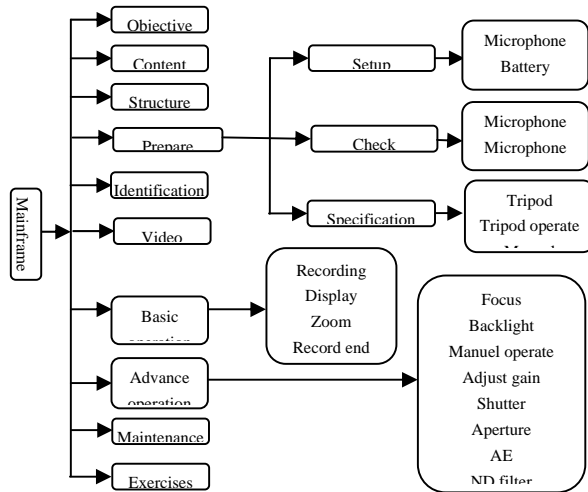


Figure 2. The architecture of the system



Figure 3. Functions of record and zoom

C. Play video tape

The main technical difficulty of play video tape is the forward and rewind control of the tape. First, the video must be loaded to the timeline, and then use the goto command to control the speed of the video playing. The key code of the forward module is:

`video_mc.gotoAndStop(currentframe+10);` and the key code of the rewind module is:

`video_mc.gotoAndStop(_currentframe-10);` the forward and rewind module can be used every where in the scene.

D. The dynamic display

The dynamic display is including date, time, week, the remaining battery, and the recording time. The time of cameral is get from the computer system time, and refresh automatically. The method is use the date time class of ActionScript get the system date and time, and shown by dynamic text field, then with the `onEnterFrame()` event process function dynamic updates by frame rate triggered.

The changes of record time can be get by `getTimer()` function.

E. Adjust gain, shutter, aperture, AE, transform, focusing

No matter adjust gain, shutter, aperture, AE, transform or focusing, they are the same principle. The changes of the effect are shown by the images which are processed by the filter function of PhotoShop. For example, the adjust gain effect can be made by the sharpen filter of Photoshop, the focus adjust function is made by the dynamic blur filter, the depth of field effect can be made by using the blur tooth to part blur, and the AE transformation effect can be made by adjusting the bright and contrast of the images. After processing the images, then load the images into a sequence of frame-by-frame animation, the use the goto sentence to go to different frame to make the changes effect.

F. Adjust gain, shutter, aperture, AE, transform, focusing

The zebra pattern effect is adjusted by the coefficient of the shutter and aperture. The zebra pattern effect is show by a group of motion parallel lines of Movieclip, above the Movieclip set a mast layer, when it is overexposure, it turn to dynamic dotted line. The adjustment of white balance is made by the changes of the hue of the white paper movieclip.

VI. CONCLUSIONS

This system first builds the integrableware library and platform, and base the integrableware construct the virtual cameral teaching systems. After developing we put the system to application of teaching, we summarize the advantage of the cameral systems as follow:

- For the reuse of integrableware, we shorten the development cycle, reduce the storage space, the development cost, and improve the efficiency of development and reuse.
- Because of its versatility and code encapsulation, when apply in the teaching, even if teachers do not understand the program design and programming principles can easily modify it, and add up resources and primitives information, so to adapt to the needs of different teachers teaching, reduce the difficulty of maintaining, realize the split and restructuring.
- Because of the advantage of freedom and openness of integrableware, and the knowledge of independence, we can replace the image resources according the need of application, and without modify the code, so every teacher can use it in class easily.
- The high intelligent and simulation of cameral, which can inspire students to think, strengthen students' practical skills, avoid or reduce the students' experimental equipment damage due to misuse, and savings on school's hardware investment and Update, realize the one-on-one virtual experimental teaching, Its network and sharing which can facilitate virtual teaching across

time and space, therefore promote the deepening of teaching reform.

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