

## A Visual MPEG-4 Scene Editor

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### ABSTRACT

The Communication and Multimedia Laboratory (CML) has developed the MPEG-4 editor for 5 years since 1998. In 2001, Digimax Production Ltd. joined this project and addressed ourselves to make this system more complete. We have implemented a visual MPEG-4 scene editor for creating 2D/3D mixed scene, with features of event routing mechanism, visual editing, and friendly user interface. With our system, one can produce highly interactive MPEG-4 content easily.

### 1. INTRODUCTION

To meet the emerging multimedia applications as well as the rapid hardware advance such as CPU power, memory size, wire and wireless network bandwidth, the MPEG committee developed the MPEG-4 standard aiming at bringing various multimedia applications onto all kinds of software/hardware platforms. An MPEG-4 compliant application may contain in one single content several different objects such as text, pictures, audio, video clips, vector-based graphics, 2D/3D meshes, virtual reality, and so forth. These are the multimedia forms we are familiar with. However, the lack of a standardized framework to integrate these various multimedia formats makes it difficult to develop highly-interactive multimedia applications. Furthermore, existing multimedia systems cannot be migrated among multiple software/hardware platforms, making it even harder to develop a general multimedia application for embedded systems.

The MPEG-4 standard is specified by ISO/IEC 14496. It builds upon three application areas: digital television, interactive graphics applications and interactive multimedia. It aims at establishing a universal, efficient coding of different forms of audio-visual data, which we call audio-visual objects. Moreover, it tries to offer a new natural and synthetic interactive multimedia. This goal will be attained by defining two basic elements:

1. A set of coding tools for audio-visual objects supporting different functionalities such as object-based interactivity and scalability, efficient compression, and error robustness;
2. A syntactic description of coded audio-visual objects, providing a formal method for describing the coded representation of these objects and the methods used to code them.

Unlike the traditional frame based multimedia standards, MPEG-4 introduced the concept of "object-based" multimedia architecture, which enables the integration of various multimedia components. To realize sophisticated multimedia applications,

MPEG-4 specifies a mechanism for describing the spatial and temporal relations among the different multimedia components of the applications. This mechanism is called the "MPEG-4 Scene Description." MPEG-4 Scene Description allows users to describe not only the spatial and temporal relations among various media, but also the interactive behavior and the logical relationships. It is the key that makes MPEG-4 suitable in various multimedia systems.

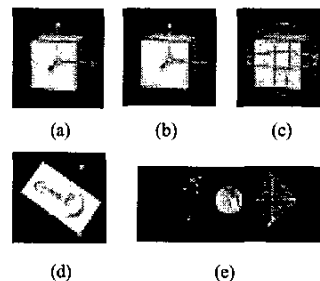
However, creating MPEG-4 Scene Description is not intuitive, but instead, is a very complicated and tedious process. The task of developing a large scale MPEG-4 application would be thus quite difficult. Therefore, in 1998, the Communication and Multimedia Laboratory (CML) of National Taiwan University began to develop the MPEG-4 Scene Editor. In September, 2001, Digimax Product Ltd. joined the project and introduced into the scene editor some fancy functions that fulfill the professional designers' requirements. To demonstrate the power of the editor, several large-scale and sophisticated MPEG-4 multimedia applications were developed.

In this demonstration, we present the MPEG-4 Scene Editor that allows users to visually edit a 2D/3D MPEG-4 scene. This article is structured as follows. Section 2 lists the features and functionalities to facilitate the editing process. Section 3 presents the system overview and several important components. The forth section describes the some MPEG-4 applications created by using our systems.

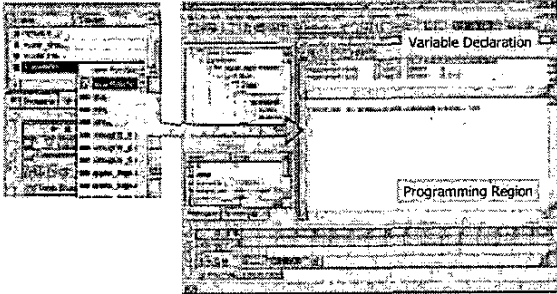
### 2. FEATURES AND FUNCTIONALITES

Our system has the following features:

- "What You See Is What You Get (WYSIWYG)" visualized editing;
- A variety of visualized controls: (a) Translation, (b) Rotation, (c) Scaling, (d) 2D control, and (e) Lighting Controls



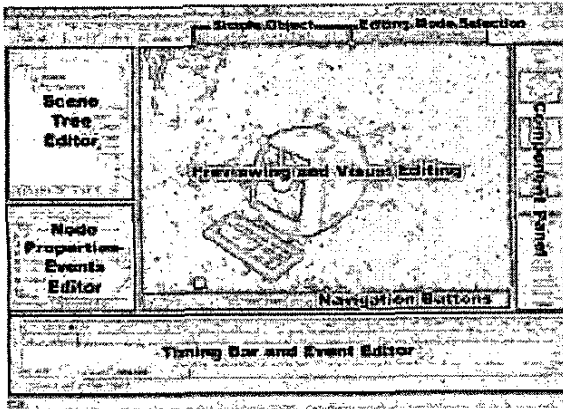
- Capability of using mouse to control the objects in the preview window;
- Simple user interface for various MPEG-4 functionalities;
- MPEG-4 File Format Exporting Wizard;
- JavaScript in PME (Property-Method-Event) style.



Our system supports most main MPEG-4 functionalities, including:

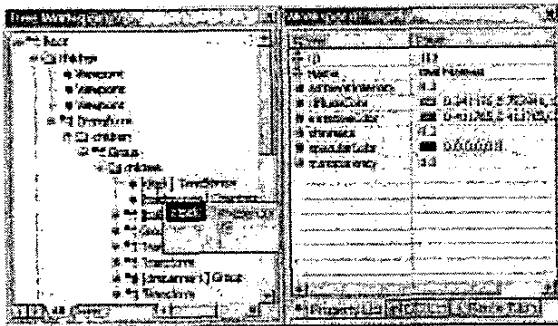
- Nodes defined in MPEG-4 specification version 2;
- Event Routing, ECMA-JavaScript ;
- BIFS-Command, BIFS-Animation, BIFS-Audio.

### 3. SYSTEM OVERVIEW

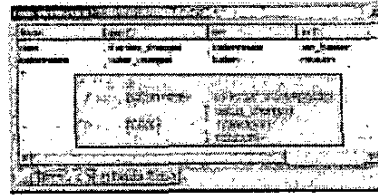


From the system operational aspect, the Scene Editor consists of six major components as follows:

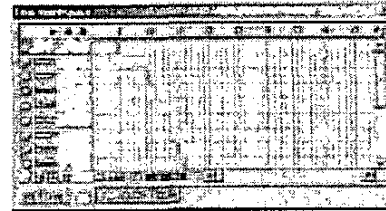
- Scene Tree Editor ;



- Node properties editor;
- Event (routing) editor;



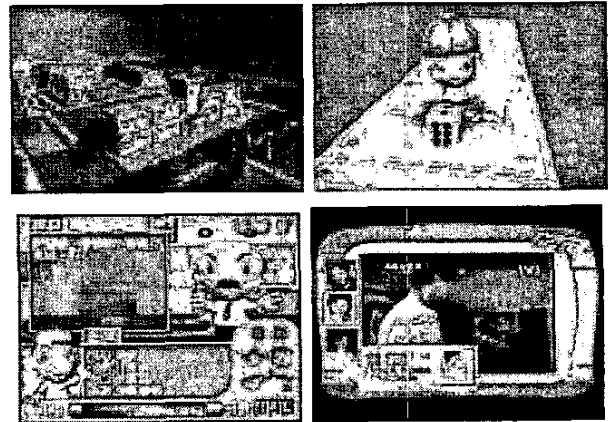
- BIFS-Commands editor;



- Previewing and visual editing window;
- Component panel.

### 4. RESULTS

We implemented our system in Windows 2000 with VC++ 6.0, BCG UI library, and Direct3D/OpenGL library. The followings give some snapshots of MPEG-4 applications created by using our system. The first three pictures is a MPEG-4 game. This game mixed 2D and 3D within a single scene, and using JavaScript to control the logical interaction. The lower right one is a MTV content and contains some video clips and 2D pictures.



### 5. REFERENCE

- [1] Meng-Jyi Shieh, Kuo-Luen Perng, Wen-Chin Chen, "The Design and Implementation of a Visual MPEG-4 Scene-Authoring Tool", 2<sup>nd</sup> MPEG-4 Workshop and Exhibition.
- [2] Meng-Jyi Shieh, Chien-Feng Huang, Cha-Dong Duh, Wei-Teh Wang, Wen-Chin Chen, "Implementation of an efficient MPEG-4 2D/3D Mixed Renderer for Visual Editing and Interactive Applications", 3<sup>rd</sup> MPEG-4 Workshop and Exhibition.