몰입형 무대 연출을 위한 시나리오 및 콘텐츠 설계 시스템

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Scenario and Content Design System for Immersive Stage Direction

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Abstract

Today multimedia technologies are playing an increasingly important role in games, movies, and live performances. In this paper, we design a flexible interactive system integrated with gesture recognition, skeleton tracking, internet communication, and content edition using multi-sensors to direct and control the performance on stage. In this system, the performer can control the elements showed on stage through corresponding gestures and body movements during the performance. The system provides an easier way for users to change the content of the performance if they intent to do.

1. Introduction

In recent years, multimedia technologies including virtual reality, augmented reality, gesture detection, voice recognition, and face detection have been widely used in games, stage performances, and camera software. The use of these technologies enhances the interactivity and quality of our product along with user experience. Most applications use them, however, not necessarily in a systematic way. In this study, we design a flexible system used for stage performance, which provides users with a visualized interface for editing and arranging the contents of the performance and thus, enables them to use it easily without having to understand many related technologies.

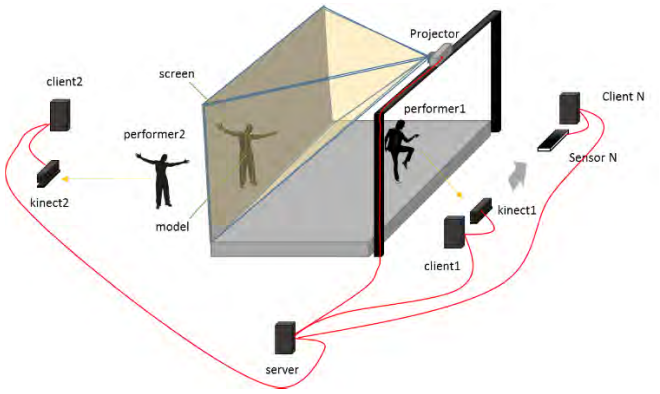
2. Related works

There are many previous works about using multimedia tech nologies in a stage performance. Zhang and Fangbemi [1] ap plied Kinect recognition and 3D holographic technologies to a traditional Chinese drama performance to generate some sp ecial effects on stage. Signer and Hoste [2] implemented a ge sture recognition engine by using Kinect detection combined with augmented reality to create a flexible and impressive da nce performance. Hong, Jung and Seo [3] developed an inter active system that displays a human body model with some i nteractive buttons, allowing users to control the model by the ir body movements and by touching some buttons to display different organs. In mixing dance performance [4] [5], the aut hors implemented a framework that enables the dancers to co ntrol the virtual characters by using Kinect skeleton tracking. Because all these performance contents and triggers are alre ady scripted in advance, it will take considerable amount of ti me and money if users want to make any change. In addition, the requirements for related technologies such as programmi ng knowledge and the knowledge of using devices make it di fficult for use. In this study, we design a system for stage perf ormance that allows users to edit and change the contents bef ore the performance and interact with them during the perfor mance.

3. Scenario and content design system

The system mainly consists of two parts, scenario editor and sensor client. The scenario editor is designed with Unity3D, which provides users with a visualized operation interface. Users can add resources such as animations, skeleton pictures, gestures, and background pictures from a local PC with the scenario editor. Besides, all the resources in each scenario should be associated with required elements. For example, if a skeleton is included in a scenario, the skeleton should be assigned a performer, period, start time, and initial position. Correspondingly, the animation also needs the same configuration, and additionally it needs a gesture to work as a trigger. Only when all these requirements are satisfied, the animation can be displayed on the screen.

The stage structure is depicted in Fig. 1. There are two Kinects connected with two clients separately in this system, and other sensors may also be included, like leap motion sensor. Kinect1 is used for detecting the performer's gesture, and Kinect2 is used for tracking the performer's skeleton. During the performance, the server controls two clients to work independently according to the designed scenario. The server determines when to activate or deactivate the Kinect. When Kinect1 detects a gesture, it sends the detected gesture result to the server, which displays animations. Kinect2 tracks the performer's skeleton information and sends it to the server. The server checks whether the received information satisfies the conditions and then decides whether to apply it to a model.

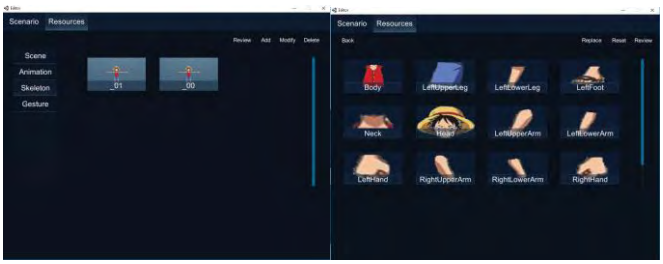


(Fig. 1) Structure of the scenario and content design system

4. Experiment

We use Unity3D to develop the scenario editor that enables the user to add, delete, or edit resources and create new scenarios for different stage performances. As shown in Fig. 2 (a), the first scene is a piece of animation; when the performer performs a required gesture, this animation will be played. The last scene is a skeleton that will follow the performer's movements when a performer is being tracked in valid time. The application installed in the sensor client is developed in MFC (Microsoft Foundation Class Library), which can record new gestures, recognize gesture types, track the performer's skeleton, and send the detected gesture type and performer's skeleton information to the server. Besides, it can react to the server's request to start or stop working. Fig. 2 (b) shows how to edit a scene; Fig. 2 (c) shows the UI of resources in the editor, and Fig. 2 (d) describes how to edit a skeleton in which the user prepares material and replaces related pictures in the skeleton to produce a new skeleton.

(a) The UI of scenes (b) The UI of editing a scene



(c) The UI of skeletons (d) The UI of editing a skeleton

(Fig. 2) UI of scenario editor

5. Conclusion

The highlight of this paper is that we implemented a flexible system for stage performances. Compared with the previous methods, the system described in this paper provides users a more systematized and visualized way to use the multimedia technologies. Moreover, the function of changing performance content decreases the associated difficulty even for those who do not understand the related technologies.

At present, we have only integrated Kinects into our system. We plan to include more sensors such as Leap Motion Sensor and Myo into this system in the future, which definitely will be beneficial in increasing visual appeal and enhancing performance.

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