Interactive 3D Animation System for Web3D

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***Abstract*—We developed a personal Web3D system more than a decade which consists of 1) simple measuring method of 3D objects; 2) automatic annotation system; 3) efficient viewer; and 4) 3D object analyzing technique. Recently, we extended the system with 3D animation. With the system, not only 3D objects are automatically animated with predetermined parameters along single time-line, but also an interactive operation on asynchronous motion is realized. To achieve this, we propose a state transition model considering a state of 3D object linked with 3D animation. By using the model, independent animations are played according to the users interaction. Furthermore, intuitive interface based on gesture is implemented with tablet PC.**

***Keywords*-Web3D; 3D animation; Tablet PC; State model**

I. Introduction

Amount of 3D contents on the Web is still small. We consider that there are mainly tree reasons for it; 1) difficulties on 3D data creation; 2) non-existence of default 3D viewer on browsers; and 3) poor quality on 3D contents. In terms of 1), recently, it is greatly resolved by new techniques [1] and issue 2) is solved by several approaches [2]. However, there is no specific solutions for 3). In this demo, we show a novel Web3D system based on 3D animation. The system does not only animate 3D objects along a time-line, but also interactive operations is allowed. In addition, gesture based interface is shown to achieve intuitive control on a tablet PC.

II. Proposed System and Data Model

In the system, we create an animation database which consists of a number of independent 3D animated sequences and a several states of 3D object. The sequences are directly linked to the transitions of the states of the 3D object. Fig.1 shows the example of state model using a printer as a 3D object. In the example, three states of 3D object are defined, such as 1) basic, 2) top cover open and 3) tray open. Note that we assume that both top cover and tray cannot be opened at the same time due to physical limitation. There are two transitions in the model, such as "opening and closing of the top cover" and "opening and closing of the tray". Transitions between states are linked to 3D animations. In our method, 3D animations are represented by rendering multiple 3D objects frame by frame (Fig.2). If a user tries to open the tray when the cover is open, animation of "closing the cover" is first automatically played and "opening the tray" is played subsequently. Such algorithm is useful to realize smooth animation even if there is no direct transition between states.

III. Gesture Interface

We developed a gesture based interface which is efficient to control 3D objects more intuitively with tablet PC (Fig.3).

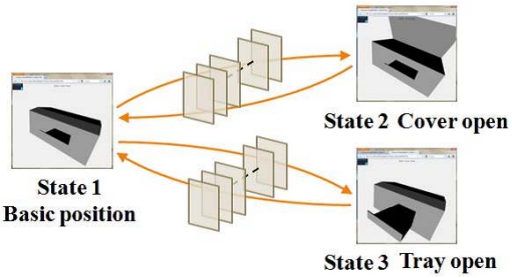

Figure 1. State transition model.

Figure 2. Animation between the states.

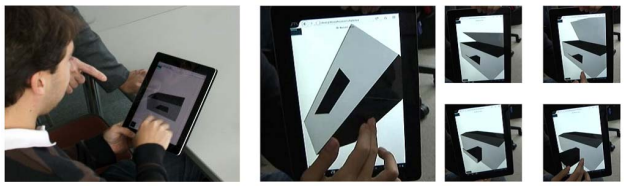

Figure 3. Implementation on tablet PC.

For example, if user flips his finger to upward direction, the cover will be opened, and if user flips to left direction, the tray will be opened regardless of touching position. We can also open the printer cover faster by simply increasing the flipping speed.

IV. Conclusion

In our system, efficient Web3D system with interactive 3D animation is developed in order to enrich 3D contents. The system has intuitive interface such as gesture based technique to play the user intended animations. In the demo, user can try 3D manual of printer by using tablet PC to learn the effectiveness of our 3D animation system.

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