

# EnhancedMovie: Movie Editing on an Augmented Desk

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## ABSTRACT

In this paper, we describe our prototype system for movie editing on an augmented desk. We aim to enable a user to edit a movie in an intuitive operation using both hands. In the current prototype system, a user can make a movie by editing a sequence of pictures. We introduce some hand gestures in the current system and then propose other hand gestures which would be implemented in the future.

## Keywords

Augmented reality, computer vision, gesture recognition, movie editing.

## 1. INTRODUCTION

With the wide spread of digital videos and digital cameras, PCs with an IEEE1394 port have become general, and it has become popular to edit and make a personal movie by oneself. Because movie editing requires a large workspace, it would be convenient to use a large display, and persons who like a large-scale display will increase more. PDH using a large display as a round augmented table for sharing a story that contains many pictures [4]. Editing a movie, requires such operations: cutting movies by setting a starting point and an ending point; changing the sequence of movies or pictures; inserting another movie or another picture. However, having such operations in a GUI application with a large display requires that people select a command and then move a cursor a lot, and several times actions would be required for completing such operations.

We have developed an augmented desk interface system called the “EnhancedDesk.” By using an infrared camera and advanced computer vision techniques, the system provides users intuitive interaction by allowing them to use their own hands or fingers for direct manipulation of both physical and projected objects. We have developed some applications, including an X window system that can be operated by fingers [2], as well as a system that links a drawing tool using gesture recognition by HMM [3]. In these applications, the merits seem to be that such an operation needs setting a length or a size after selecting a command like making a circle or a rectangle. For example, in making a rectangle, users in a GUI system have to select a command and then specify two corners (or a center point and one corner); these tasks require three actions. In our system, the user can make a rectangle by drawing a vague one with a finger, an action which is realized

by gesture recognition. The user also puts both hands on EnhancedDesk while making a right angle with a thumb and a first finger, which is equal to selecting a command and specifying two corners. A two-handed system [1] allows users to perform certain tasks which are usually done one-by-one with one mouse simultaneously.

Movie editing might be one application which can make use of this aspect, because the operations in movie editing described above need users to specify a command, a length or a location. We are developing a system with which users can edit a movie on our augmented desk interface system; this new system is called “EnhancedMovie”. This paper describes the prototype system that we have developed, and introduces gestures that should be integrated into our system.

## 2. EnhancedMovie

### 2.1 Prototype system

In this section, we introduce our prototype system, which makes a movie from a sequence of pictures. It loads pictures in the specified directory and displays them on the desk using a flow layout.



(a) moving a picture: {1&2} grabbing a picture. {3} moving the picture. {4} releasing the picture.



(b) cutting a picture: {1&2} grabbing a picture. {3} moving the picture. {4} cutting the picture

### Figure 1: gestures with one hand

The system recognizes closing all fingers as the “grabbing” gesture and opening all fingers as the “releasing” gesture. When a user makes the grabbing gesture on a picture with one hand, the picture is selected and is specified as a target for subsequent operation. The selected picture is highlighted in red, which will let the user know that the picture has been selected. When the user moves the fist by closing the hand and then performs the releasing gesture, the selected picture is

moved to a location between the two pictures where the releasing gesture was done (Fig. 1a). When the place is not between two pictures, moving the picture is not done. When the user moves the fist outside of the desk keeping the hand closed, the picture is cut (Fig. 1b).



(a) moving some pictures at once: {1&2} grabbing pictures with both hands. {3} moving the pictures. {4} releasing the pictures.



(b) cutting some pictures at once: {1} two fingers are opening. {2} these are closing. {3} these are opening again.

**Figure 2 : gestures with both-hands**

When the user makes the grabbing gesture on two pictures with both hands, pictures between the two pictures are selected and are specified as the start and end points for the subsequent operation. The selected pictures are highlighted in green. When the user moves the fists and then does the releasing gesture, the pictures are moved to a location between which the two pictures where the gesture was done (Fig. 2a). This intermediate point is shown as a white square. While the user moves the fists with hands closing, the square moves together, so that the user will know the inserting point. In order to cut some pictures, the system recognizes another gesture. When the user puts both hands on two pictures while opening only the index finger and the middle finger and gathers the two fingers, the pictures between the two specified pictures are cut (Fig. 2b). The user puts both hands on two pictures while opening the index finger for two seconds; then the system makes a movie composed of pictures between the two, and starts to play the movie in another window (Fig. 3). When the gesture is completed, the pictures are highlighted in blue. While the system is making a movie, the color changes into white gradually. In this process, we utilize JMF (Java Media Framework) 2.1.1 and QuickTime for Java.



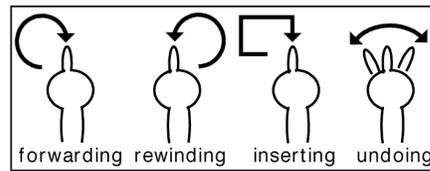
{1} A start point and an end point are specified. {2} The made movie starts to play in another window.

**Figure 3 : making a movie**

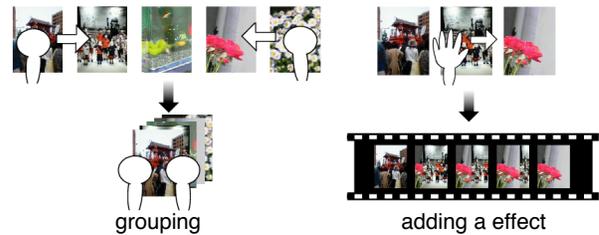
## 2.2 Gestures planned to integrate

The gestures implemented in the current system utilize only the numbers of fingers and the locations of fingers. We will integrate our system's capability for recognizing various hand

gestures [3]; those gestures include: drawing a circle; drawing a rectangle; and waving a finger. We will make the following functions correspond to these gestures: forwarding and rewinding a movie; inserting a frame for texts; and undoing an operation (Fig. 4a). We will implement other gestures which utilize directions of moving-hands, and those that join both hands, and sliding a hand. The gestures will correspond to the following functions: grouping pictures or movies; and adding an animation effect to the movie (Fig. 4b). When the user joins both hands on two pictures, pictures between the two will be grouped together. An animation effect will be added according to the direction of the moving-hand. For example, when the user moves a hand on a picture to the right, the system will add a slide-out effect to the right direction.



(a) gestures with finger-trace



(b) gestures with direction of moving-hand

**Figure 4 : gestures to implement**

## 3. DISCUSSIONS

We introduced the prototype of the movie editing system on our augmented desk interface and the gestures which we will implement. The current system loads only pictures; in the next system, users will be able to load some movies and to edit them. We will also evaluate it by comparing it to a GUI application using a mouse.

## 4. REFERENCES

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