

INTER COMMUNICATION THEATER - TOWARDS THE REALIZATION OF INTERACTIVE MOVIES -

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Abstract - A new type of media called 'interactive movies' is proposed which will be realized by the integration of conventional medium such as movies, telecommunications, and video games. The interactive movies have the capability of creating a virtual world with various kinds of realistic/hyper-realistic scenes and computer characters. The metaphor of 'Inter Communication Theater' gives people the ability to interact within this virtual world. Therefore people can experience the stories of the virtual world through interactions with the characters and the environments of the world. In this paper, the basic concept of such a new media will be described along with an experimental system we have developed.

INTRODUCTION

A significant change is now taking place in the fields of communications and entertainment. This change can be described by a single statement: A new technology is bringing cyberspace to communication and entertainment.

Efforts have been made to create a new dream media by combining the new currents of technology that are tiding over the fields of communications, movies and games. In this paper, we call this dream media "Inter Communication Theater (ICT)." The ICT produces a cyberspace that offers hyper-realistic images and scenes, and enables people to "enter" that virtual reality. In cyberspace, people can communicate with others, and interact with the human-like characters, animals and plants in the story. This function enables an individual to create his or her unique cyberspace, in which a person can act out the leading role.

In this paper, we describe the ICT that can bring us all these possibilities. We will also introduce the details of the ICT project that we are currently working on.

POSITIONING OF THE ICT

Concept

The ICT is a new type of media that integrates conventional media such as movies, novels, video games and communications. The closest description of ICT, in relation to conventional media, is "movies or theaters that allow the audience to 'experience' the story through participation."

ICT consists of the following elements.

- (1) Interactive stories that allow the participant's interactions.
- (2) Participant who "experiences" the virtual reality created by the interactive story as the main character.
- (3) Characters that interact with the main character in the story development.

ICT as a new type of media

We have examined the possibility of creating a new type of media by combining a movie's story development capability with visual and audio information, the novel's power to appeal to people's imagination through a simple media form that uses words (language), and the interactive feature of video games. Various attempts have been made in the past to create a virtual reality that interacts with the audience. These efforts include the creation of computer-generated characters [1] [2] that can interact with people on behavioral and emotional levels, and interactive art [3]. However, in these achievements, the interactions were short-lived, and there was no story involved. The movie industry has long cherished the idea of audience-participating movies, but the actual application has been limited to primitive levels. Video games, especially role playing games (RPGs) are the closest in concept to ICT, but the essential difference is that RPGs require button operations for interactions while ICT aims to enable "person-to-person" interactions. ICT has the following main features.

(1) Establishment of a cyberspace with images and sound

The use of CG, mixing of CG images and actual footage, as well as the application of three-dimensional image and sound technologies enable the creation of a virtual reality that was not offered by any other media. This cyberspace provides an unprecedented level of stimulation to the imagination of people.

(2) Experiencing the story in cyberspace

In ICT cyberspace, the participant is more than an observer; the participant is the main character in the virtual reality and experiences the story that takes place in that world. This is expected to provide a new realm of experience to people.

(3) Interactions in cyberspace

People can interact (communicate) with other "residents" of cyberspace - in the case of a movie, characters surrounding the main character - by talking and gesturing in the story.

The creation of this function requires combined efforts in both technical and artistic areas [4]. In many of the successful media such as movies and RPGs, creative efforts in technical and artistic people are effectively joined. In developing the ICT, creating "advanced" interactions should not be the main focus of using the latest speech and image processing technologies. Instead, the interaction technology should be regarded as a means of enabling the audience to participate in the interactive story and to experience the virtual reality. For this reason, the technical features of interactions must be in balance with other elements. Artistic aspects are also important in interactive stories. Therefore, artistic talents (script writers, visual artists, music composers, etc.) must be maximized in ICT production, so that the story takes full advantage of interactive features, the visual images captivate the viewers, and the music enhances the visual images.

EXAMPLE OF SYSTEM CONFIGURATION

Based on the above concepts, we are currently developing an ICT system. The details of this system are as follows.

Main features

(1) Collaborative work between artists and engineers

As stated before it is essential to have artistic tastes in creating ICT which is able to catch the heart of people and lets them feel empathy. In our project, therefore, in such areas as the creation of an interactive story, music, and CG characters, artists played the main role. On the other hand, in the area of software and hardware system production as well as the interaction technologies, engineers are the key persons.

(2) Adoption of virtual reality technologies

Three-dimensional images projected on an arched screen recreate a true-to-life scene setting. These virtual reality technologies help draw the audience into the world created by the interactive movie.

(3) Natural interactions including non-verbal interactions

Speech recognition and gesture recognition functions are used to achieve natural interactions through verbal communications and gestures. In addition, to make non-verbal interaction possible, recognition of emotions involved in speech is introduced.

(4) Multi-story CG animation

Because an interactive story results in a complicated story development, a huge amount of animated images must be prepared for each and every story developing possibility. Although the amount of necessary images can be greatly reduced by equipping the CG characters with an autonomous function, taking that approach can result in unnatural animation. In our research, therefore, we have placed our priorities on achieving the highest level of animation quality, and have prepared all the necessary animated images in advance.

Software configuration

Figure 1 shows the software configuration of our system.

(1) Script manager

The script manager controls the overall development of the story based on the interactive scenario produced from the script and scenario prepared by the story writer.

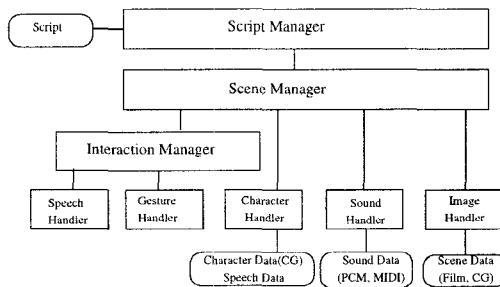


Fig. 1 Software configuration

An interactive story consists of various kinds of scenes and transitions among scenes. Each scene also consists of various kinds of 'shots' and the transitions among these shots. The functions of the script manager are to define the composing elements of each scene and to control scene transitions based on an infinite automaton as shown in Fig. 2. The transition from a

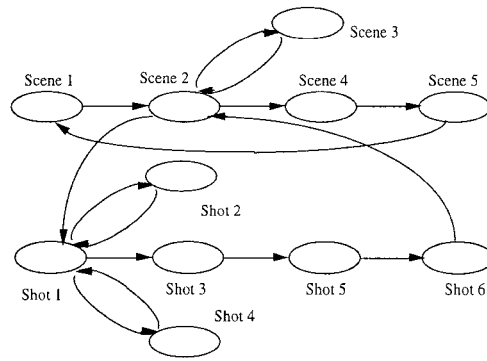


Fig. 2 Scene and shot transition

utterances including the timing for each utterance.

c) The kinds of interactions between a participant and these characters including the timing for the interactions.

The background scenes are made by mixing CG-generated sceneries and actual footage. At the beginning of each scene, the scene manager starts the output of the scene image and background music by sending commands to the appropriate handlers. The characters are generated by CG. Using the information of b), the scene manager starts the animation of each character by controlling the character handler and, at appropriate time, lets them speak utterances. Additionally, at the predetermined time, the scene manager starts the interactions by sending commands to the interaction manager.

(3) Interaction manager

The interaction manager is under the control of the script manager and the scene manager. The interaction manager controls the interactions that take place in each scene. The interactions are based on speeches and gestures. We use voice recognition, emotion recognition, and image recognition functions as the means of interaction. By receiving commands from the scene manager that indicate the types and timings of the interactions, the interaction manager starts the speech recognition, emotion recognition, and gesture recognition by controlling the appropriate handlers. After receiving multiple recognition results, the interaction manager combines these recognition results, obtains the interaction result and sends it to the script manager through the scene manager, thus achieving a multi-modal interaction function.

(4) Handlers

The handlers are under the control of either the scene manager or the interaction manager. Their functions are to control the various input and output devices. We use the following handlers in our system.

a) Speech handler

The speech handler controls the speech recognition function and emotion recognition function. The speech recognition algorithm is based on an HMM while the emotion recognition algorithm is based on a Neural Network architecture[2].

b) Gesture handler

c) Character handler

scene to one of possible consecutive scenes is decided based on the interaction result sent from the scene manager.

(2) Scene manager

The scene manager receives the definition of each scene from the script manager and controls the creation of the scenes. Each scene consists of the following factors.

a) Background scene and background music.

b) Character animations and their

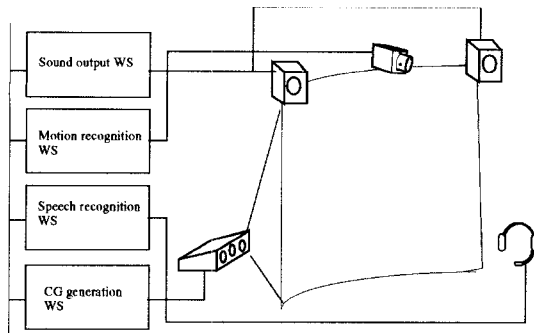


Fig. 3 Hardware configuration

- d) Sound handler
- e) Image handler

Hardware configuration

Figure 3 illustrates the hardware configuration. With a high-speed CG generating WS (Onyx Infinite Reality) serving the core function, the system also includes a speech recognition WS, a motion recognition WS and voice and sound

output WS. The visual outputs are projected onto the arched screen by two projectors.

EXAMPLE OF INTERACTIVE STORY PRODUCTION

We have produced an interactive story based on the previously described concepts and system. We selected "Alice in Wonderland," a very famous story, and "Urashima Taro," one of the representative fairy tales in Japan, as the base stories for the following reasons.

- a) These stories are familiar to everyone, so they can easily attract the attention of people.
- b) These stories are simple, yet have a profound impact. Because they are simple, they can be easily reconstructed.
- c) The stories contain visually attractive scenes.

The integrated interactive story is called "Wonderland." A brief summary of Wonderland is as follows. First, let's suppose you are a participant and will act the role of the main actor (or actress) in the interactive story. In a fairyland, you see a rabbit being cruelly treated by several gangsters. Upon sympathizing with and helping the rabbit, you are led to an electric pheromone castle-Wonderland. There you are warmly welcomed by Muse who is the princess and ruler of the Wonderland castle. You experience various kinds of wonderful things such as musical entertainment, interactive poems, and so on. After having a good time, you finally decide to go back. Muse gives you as a gift, a treasure box with a message not to open the box. After returning home from the castle, you find it difficult to keep your word to Muse to not open the box and finally open the box. Then

To make the story interactive, several branching points are included in the story. Examples of the branching points are as follows.

- a) Whether or not to help the rabbit that is being cruelly treated by gangsters.
- b) Whether or not to stay at the castle.
- c) Whether or not to open the treasure box.

The participant stands in front of the screen wearing a 3-D LCD-shutter glass and holding a microphone. The participant follows the story presented in images and sound, and participates in, and experiences, the story development through interactions with the characters in the story. Figures 4 and 5 show a participant interacting in the story.



Fig. 4 Example of interaction (1)



Fig. 5 Example of interaction (2)

CONCLUSION

This paper describes the Inter Communication Theater (ICT), which is considered to be a new type of media that integrates various media types including communications, broadcasts, movies, stage performance and video games. In ICT, people enter cyberspace and enjoy the story development in cyberspace by interacting with the characters in the story. In the paper, we tried to explain the concept of ICT. We also described the configuration of the system we are currently developing as an example of the ICT application, and the context of the interactive story that was based on a Japanese fairy tale. We have constructed the first-stage system, and are now evaluating this system.

References

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