Fight our Shadow Robot

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1. INTRODUCTION

Recently, many researchers have developed computer support systems for handwork design [1]. Using these systems, museums and universities have conducted handwork workshops, in which novices have mastered specialized knowledge and techniques. Moreover, the participants have found these activities interesting and enjoyable. Such workshops offer important opportunities for adults and children to use advanced technology.

2. FIGHT OUR SHADOW ROBOT

In this study, we propose the use of advanced technology in workshop environments, which drastically enhances the workshop experience by making it interesting and enjoyable. We develop "Fight! Our Shadow Robot"—a digital workshop that offers recreational paper-craft activities.

Our workshop is based on a dramatic fictional scenario. Children imagine and then create original robots to protect their city from enemies. They carry out this protective function using their own bodily actions. The workshop involves the following tasks. First, the children use markers of their favorite colors to draw on a paper-craft template. Then, we convert their drawings into digital images using a scanner. Subsequently, the children make original paper-craft robots using glue and scissors. Finally, they play the video game by operating the robots through their bodily actions. Thus, this workshop enables children to experience three recreational activities: drawing, making paper-craft objects, and controlling these objects through their bodily actions.

2.1 System Setup

Our system consists of a server module, multiple client modules, and a router that connects these modules to form a LAN. Figure 1 shows an overview of the system.

Children draw on paper-craft templates and hand them over to personnel in charge of a server, who scan in the templates using the image scanner connected to the server. The templates are returned to the children immediately after scanning. Then, the children take the paper-craft templates to a client system and use its barcode reader to scan in the bar codes on the templates. A game program in the client system obtains image files from the server using a key, which is the identification number read in by the barcode reader. Finally, the game program uses the image files as textures for 3D models of the robots.

2.2 Video game

We developed an original video game based on the Unity game engine. The pose of a robot during a game is determined by that of the player, which is recognized by Microsoft Kinect—a motion-sensing input device. The body information recognized by Kinect can be easily handled by a library based on the OpenNI framework, which is compatible with Unity. The robot skeleton is matched with the input human skeleton using OpenNI.

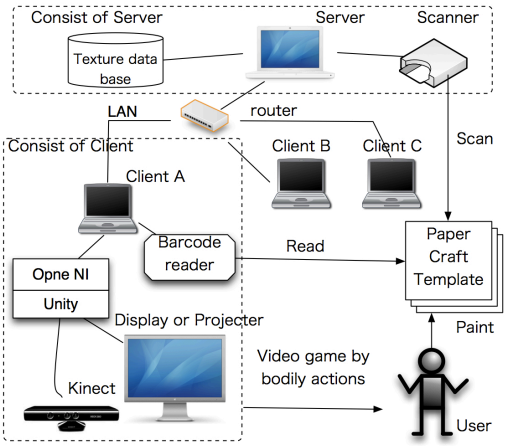

Fig.2: System constitution.

3. RESULT

We conducted our workshop at a Chigasaki primary school in Yokohama. The children were amazed by the system; they found the activities highly interesting and enjoyable. Many of them stated that they would like to play again with the robots they designed. We plan to develop a system that enables users to play the game on a network, using the created robots.

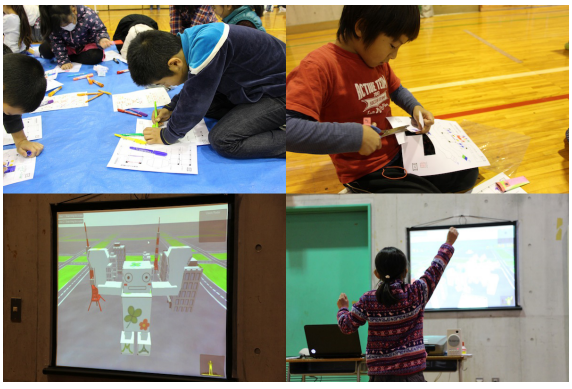

Fig.2: Experimentation of "Fight! our shadow robot".

4. REFERENCES

[1] Mitani,J. and Suzuki,H.:"Making Papercraft Toys from Meshes using Strip-based Approximate Unfolding", ACM Transactions on Graphics(Proceeding of SIGGRAPH 2004),23(3),pp.259-263(2004)