Virtual Yamahoko Parade with Vibration

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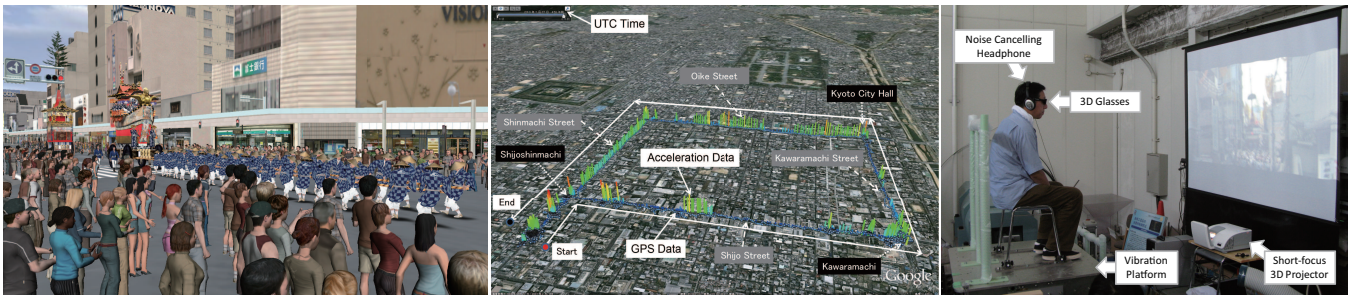

(a) (b) (c)

Figure 1: *(a) Virtual Yamahoko Parade. (b) Acceleration variation illustrated on Google Earth. (c) Experimental parade experiencing system with a vibration system.*

1 Introduction and Motivation

With the development of computer graphics and virtual reality technologies, extensive researches have been carried out on digital archiving of cultural properties. For decades, tangible cultural heritage contents including historical crafts, archaeological sites, and historical buildings have been digitally archived. Recently, digital archiving of intangible culture heritage contents, such as traditional festivals and behaviors of participants in cultural events have attracted more and more attention. Yamahoko Parade of Gion Festival, one of the most famous festivals in Japan, becomes a symbolic landscape in Kyoto. During the festival, 32 floats (*yama* and *hoko*) representing each local neighborhood parade in the city center. We conduct researches to restore and represent this exciting event, full of Kyoto's tangible and intangible culture and tradition, with cutting-edge technologies such as laser scanning, CG modeling, motion capture system, 4D-GIS, high fidelity sound recording, and vibration system.

In this research we built an interactive 3D virtual environment based on our previous work [Choi et al.]. As a new step, we are trying to build a virtual parade experiencing system with a vibration system. During the parade, the general publics are not allowed to get on the floats. However, such a special experience on a special occasion can be experienced by anyone via the proposed system.

2 Virtual Yamahoko Parade

We construct the virtual parade and combine the motion acoustics of the floats, crews, and spectators using Vizard (cf. figure 1a). (1) The street model of "Virtual Kyoto" [Yano et al. 2007] is developed using various technologies and materials, such as GIS data, cadastral maps, aerial photos, street photos, and landscape paintings. (2) Four CG floats (*naginata-hoko*, *kanko-hoko*, *fune-hoko*, and *kitakannon-yama*) are created by laser-scanning detailed miniatures of the real floats, as well as surveying the floats' drawings. (3) Four kinds of CG parade crews are created: *hikikata* who pull the float; *ondotori* who lead the float; *kurumakata* who control the float's directions; and *hayashikata* who play instruments on the platform of the float. Since character animation of these crews is crucial for regenerating realistic movements of the parade, we use motion capture technique to reproduce the unique motions of the crews. (4) We arranged 730 CG models of spectators on both side of the street to regenerate the atmosphere of the event. (5) We recorded the music of the parade played with the traditional instruments of drum, flute, and bell, as well as the sounds of ambient noises made by the floats, crews, and crowds, using multi-point measurement technique. The content of "Virtual Yamahoko Parade" can be operated in 3D vision along with high fidelity 3D sound environment. Users can interactively control the viewing position and angle in the virtual world at real time with a control device such as a gamepad.

3 Vibration System

We are trying to build a virtual parade experiencing system in an immersive virtual environment that allows the users to experience the atmosphere of the parade from the view point of the parade crews. We collected route data and acceleration data of *fane-hoko* using a GPS logger and acceleration sensors during the parade. We also captured the scene on the performance stage by a 3D front view camera during the rehearsal parade. The acceleration variation along the parade route can be visualized on Google Earth (cf. figure 1b). The acceleration data is transformed into displacement data and is employed to reproduce the rolling and vibration using a vibration system with 3 degrees of freedom. We built an experimental system by integrating vibration, sounds, and 3D videos (cf. figure 1c). In the evaluation experiments, we received positive feedbacks from 6 crews of *fune-hoko* who had the experiences of riding on the performing stage of the float.

As future work, we are going to build a virtual experiencing system with real-time interactive control by integrating the CG content of Virtual Yamahoko Parade and the vibration system.

References

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