

Ton²

-A VR Application with Novel Interaction Method using Displacement Data-

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Abstract: This project introduces a novel interaction method using displacement data, as a match-up style VR application named “Ton²” in the theme of Paper-Craft Sumo. This VR system captures the waving motion data, and from those data, the participants play the Japanese traditional game, Paper-Craft Sumo in a typical way.

Keywords: Paper-Craft Sumo, VR, Interactive Device, Displacement Data

1. Introduction

Ton² is a new body sensory style VR application that is implemented by using intuitive and robust interaction model. This application captures the player’s motion data as displacement values by means of the distance sensors, and uses the data for its interaction model.

We have revived the old traditional game in Japan, “Paper-Sumo”. Normally, we play this game on board using papers and cardboards, but we design it to a game that could be played at underwater. We used the water as the media, not just to enjoy the game, but the players could also feel the comfort of holding down the water. Moreover, making the application in one package, player could feel the feed back of the opponent as they play the match-up. At the 3D imagery, which is projected on the floating screen, the powerful performance of Sumo will be fought by the movement of the Sumo-Wrestlers, influenced from the both player pushing down to the field of water.

2. System Configuration

This system consists of following four modules, as depicted in Figure 1; (1) Projector that projects the image on the screen, which floats on water. (2) Wave Generator Cube (WGC) is to generate the waves from the hold down action of the player. They are disposed 3 on the both sides of the tank. (3) Distance Sensors are to obtain the displacement data. They are disposed four on the corners of the screen and six for each WGC, which are all set under the tank. (4) Computer, which controls the whole system, calculates the input data from the A/D conversion board.

The process flow in the system is as follows;

- (P1) The Distance Sensor obtains the displacement data, from the six WGC and four corners of the screen.
- (P2) Collecting all the displacement data, the computer calculates the velocity of the hold down action of WGC and the change in slope of the floating screen.

- (P3) By using the results of P2, the computer calculates the influence about the movement of the Paper-Sumo Wrestler.
- (P4) The system calculates the interference and reaction of both wrestlers. At the same time, it determines the whether either of the wrestler won or lose.
- (P5) Generate the 3D imagery of both wrestler and projects from the projector.

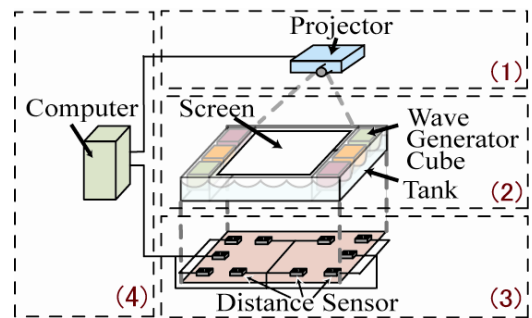


Figure 1: System Configuration

3. Result

Players experienced “Paper-Craft Sumo” in the way of underwater, and enjoyed the game in typical way. The 3D imagery expression, as Sumo held in underwater, will be a visual enjoyment and the generated waves going back and forth in the tank will also give the participant the rhythmical comfort, while they have fun playing the match-up.



Figure 2: Appearance of the experience

Ton², since the input is not direct handling of the wrestler, but to influence the wrestler by the waves, participant can play it only with their intuition, the techniques aren’t required at all. Therefore, any ages of the participant could play equally in the fields of Ton², as it was one of the fascinations of the traditional Paper-Sumo. Moreover, for feedbacks, the influencing wrestlers will stimulate the participant as the visual sensation and the come-and-go of the waves will also stimulate the participant as the physical sensation.

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