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A Design and Implementation of 3D Image Interactive Vision System

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Abstract. Recently, the interactive display is providing various interaction interfaces to users through ubiquitous computing technologies. This means that they can experience the tangible interactive interface environments with various contents. In this paper, we propose a spatial multi interactive system that provides the various touch interactive to multi-user in the large display environment. In other words, it is possible to interact in the 3D space without touching directly on the screen. And then, the users can interact with only natural hand movements through the IR LED Array bar installed in the ceiling. Moreover, by providing the realistic contents through 3D image, the users can enjoy more realistic and tangible contents.

1 INTRODUCTION

Recently, the multi-touch technology in many different fields is providing an intuitive interface. One of them is a Table-top system like Microsoft surface [1], and other is an Interactive Wall Display [2]. These traditional methods are used in a variety of applications, but they seem the difference depending on the formal feature, the installation space and purpose. In other words, research of multi-user on a single system can work in cooperative systems [1,3,4,5,6], the mutual collaboration system [7,8] though the network infrastructure are going to expand. In addition, a form of independent electronic device [1,9,10] through the new user interface is developing.

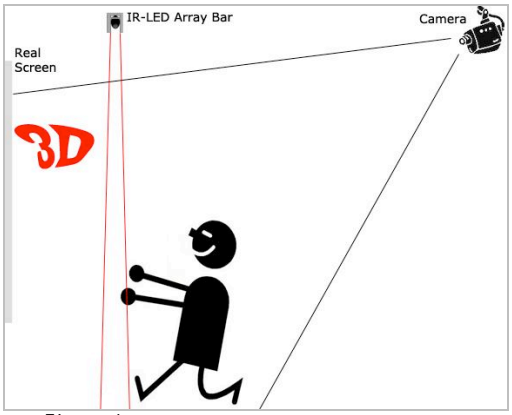

Figure 1. 3D Image Interactive Vision System.

This paper also proposes a user interface system as a new form. There are two features of the system. 1st, our system uses a 3D image system that provides realistic contents to the multi-user. 2nd, we don't touch screen directly as previous systems, but use an interaction layer for spatial interaction. This layer offers a sufficient distance for more user experience, spatial interaction and experience of realistic content.

2 3D Image Interactive Vision System

The system consists of two 3D image projectors, large display for real projection, IR-LED array bar and IR Camera (fig. 1). A system flowchart is as follow (fig. 2). There are two nodes for data processing. One is a client node that processes acquired images from IR camera through a simple image processing method. The other is a server node that generates metaphor information from received data in client node.

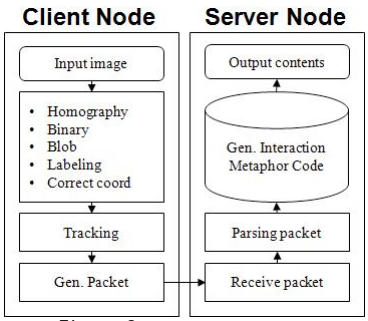

Figure 2. System flowchart.

We must know a hand location and movement to define interaction between user and 3D image contents. For hand tracking, we use IR-LED and IR camera. IR-LED array bar always shoot IR light(we called "Interaction Layer"). If hand touches that, IR light is reflected. Then camera detects it as tracking(or location) data.

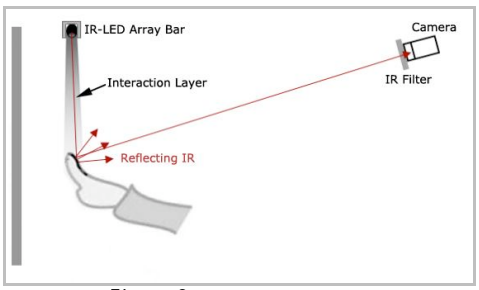

Figure 3. How does it work?

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Though these process, we can interact 3D image contents (fig. 4). Figure 4 is the content of Upo Wetland Ecosystem Pavilion.

figure 4. 3D Image Contents

3 CONCLUSIONS

In this paper, we propose the 3D image interactive vision system that provides an interaction UI for 3D experience and reality. It can interact with multi-user in spatial, and they just need simple hand gestures to interact our system. Our system has some limit that can only recognize simple actions and more closed user with IR camera. So we will improve our system for more accuracy, image experience and performance, and add more gestures, screens. We are expecting our system that can be useful to various exhibition areas for 3D experience.

Acknowledgements

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