**Abstract**

PRIMA (Parallel Reality-based Interactive Motion Area) is a virtual reality system that can interact with past oneself and/or other people been in the system area by using multiple Kinects and synchronized user tracking.

**Concept**

It is interesting to superimpose scenes in another time at the same place over the real scene in real time simultaneously using virtual reality technologies. We call it as “Parallel Reality.”

**Parallel Reality:**

A technology that expresses past or future scenes on the current scene simultaneously at the same space.

The concept of this study is to propose a system to provide interactions between a person in real-time world and other persons in past time at the same place (Fig. 1.) We describes a implementation of a system named “PRIMA (Parallel Reality-based Interactive Motion Area) and some contents using Parallel Reality. The concept of our system presents us more immersive and curious experiences. Using our system, for example, unusual games can be made that plays it with past players, or creates enemies from people in the real world (Fig. 2.)

**Implementation**

**Get image and depth**

PRIMA consists of four Kinects, four clients, a server, and a touch panel interface. Using OpenNI library, each client gets image, depth, and user data from a Kinect, and send them to the server.

**Synchronized user tracking**

Each client tracks users and sends their labels to the server. We needs to synchronize these user labels since user labels of each Kinect are not related to other ones. We hypothesized that two user labels were for same one if a distance of centers of the user-labeled pixels was less than a threshold (Fig. 5, threshold: 300mm.)

**Record and play**

PRIMA can record and play 3D motion data about a specific person. We can create a new scene that some users in various past times are reconstructed over the current scene by using person-separated logs.

**3D reconstruction**

PRIMA can reconstruct scenes in real time. We calibrated four Kinects and calculated transformation matrices previously. This system can avoid occlusion problem to some extent because it uses multiple Kinects put on different positions.

**Contents**

- Fig. 8 Wandering past ghosts
- Fig. 9 Let’s prank past myself!
- Fig. 10 Fight with agents from the past

**Future works**

Besides improvement quality of the reconstruction, we needs to create more attractive and interactive contents.