VISTouch

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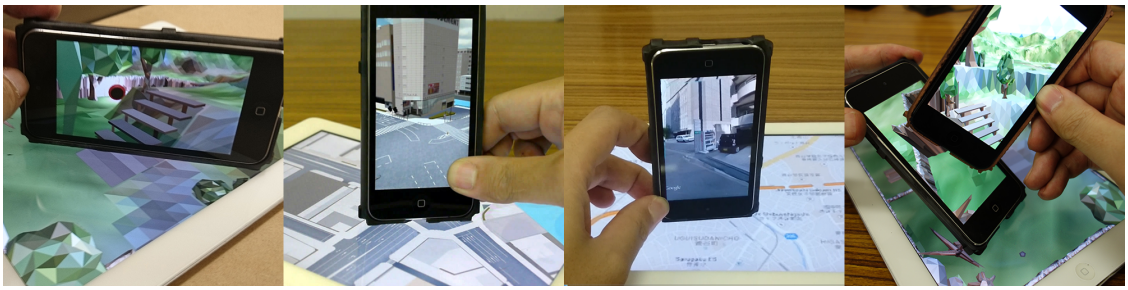

Figure 1: *Depiction of VISTouch in use.*

1 Introduction

Various studies have been done on the combined use of mobile devices. Ohta's Pinch [Ohta and Tanaka 2012] and Leigh's THAW [Leigh et al. 2014] are representative studies. However, they have certain limitations; Pinch cannot dynamically correspond to the positional relations of the devices, and THAW cannot recognize the devices' spatial positional relations. We constructed VISTouch so that it does not require a particular kind of external sensor, and it enables multiple mobile devices to dynamically obtain other devices' relative positions in real time. We summarize VISTouch in this paper.

2 System

The VISTouch system requires a multi-touch function that recognizes more than three points, an internal acceleration sensor, and a Bluetooth function. The only tool required to use the system is a VISTouch case that has three protuberances on each side (i.e., twelve protuberances in total). The case is fabricated from resin used in 3D printing and coated with conductive ink. The case enables VISTouch to be applied to many mobile devices regardless of the OS.

When a child device in the case is touching a parent device's display, the system obtains and determines coordinate data of the connection points. The distances between any two protuberances are different, so the system can identify which side or face of the child device is on the parent display by connection pattern matching. In addition, the system also obtains the biaxial angles between devices, and the parent device sends this information to the child via Bluetooth. The child device dynamically calculates its spatial position and angle by using this information and the parameters of its internal acceleration sensor.

Moreover, when more than two devices are used, we assume that they are connected in series; that is, a parent device is connected to a child device, and the child device is connected to a grandchild device. Each connection is approximately the same as a connection between just two devices, and all devices share the information of their relative positions via Bluetooth, which is used with the Multipeer connectivity framework on iOS. If the Android OS is used, the system requires an alternative communication method.

3 Application

VISTouch recognizes multiple devices' positions in real space and spatially represents the correct relative position and angle between the devices; therefore, it enables users to easily understand the spatial relative position in 3D virtual space and to handle the displayed content intuitively. For example, when a tablet is used as a parent device and a smart-phone as its child, the smart-phone can display the Street View on the horizontally placed tablet. Additionally, the system can be applied to play games on multiple child devices.

4 Conclusion

VISTouch provides great potential value as a multi-display device that determines the relative position of the devices with high precision and small processing load. Therefore, we expect that new content will be created and expanded with VISTouch.

References

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