Calibration and Interaction in Optical See-Through Augmented Reality using Leap Motion

Kenneth R Moser* Sujan Anreddy† J. Edward Swan II‡

Mississippi State University
Department of Computer Science and Engineering

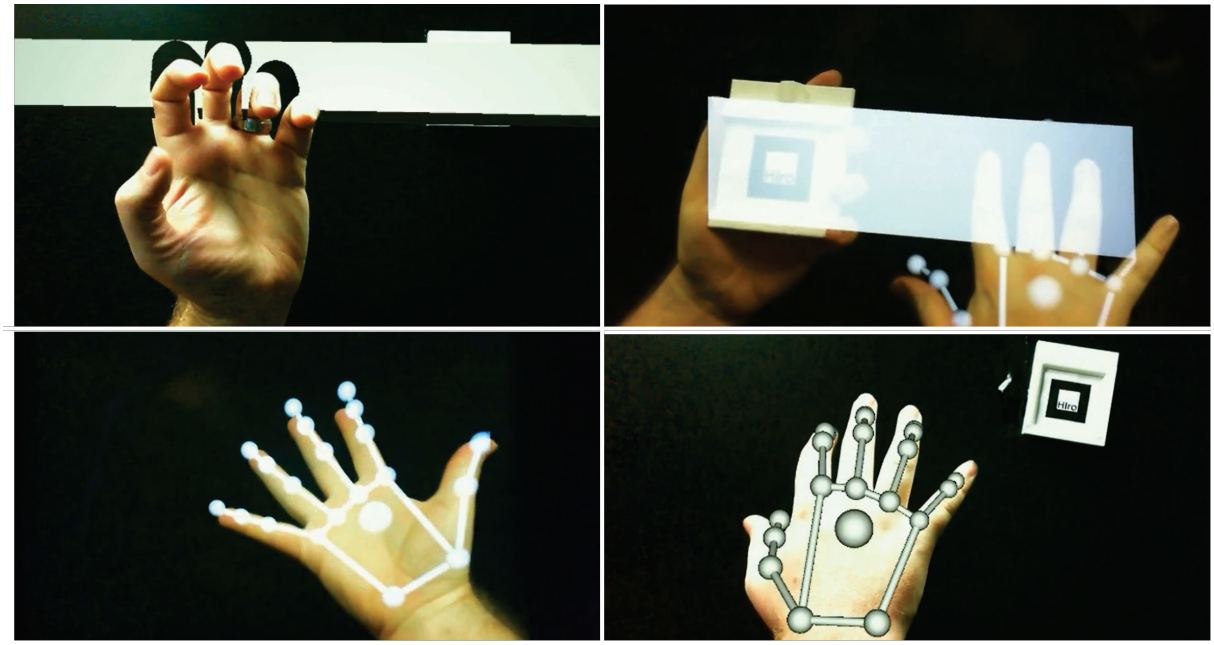

Figure 1: Use of Leap Motion tracking data in optical see-through and video see-through AR applications. (Top) Interaction and occlusion between a user's hand and virtual content. (Bottom) Tracking data overlayed onto a user's hands.

Abstract

The growing prevalence of hand and gesture tracking technology has led to an increased availability of consumer level devices, such as the Leap Motion controller, and also facilitated the inclusion of similar hardware into forth coming head mounted display offerings, including the Microsoft HoloLens and Moverio Pro BT-2000. In this video, we demonstrate the utility of the Leap Motion for calibrating optical see-through augmented reality systems by employing a variation on Tuceryan and Navab's Single Point Active Alignment Method [3]. We also showcase a straightforward method for calibrating the coordinate frame of the Leap Motion to a secondary tracking system by employing absolute orientation algorithms [2, 1, 4], allowing us to properly transform and visualize hand and finger tracking data from the user's viewpoint. Our combined display and coordinate frame calibration techniques produce a viable mechanism for not only intuitive interaction with virtual objects but also the creation of natural occlusion between computer generated content and the user themselves. We believe that these techniques will be pivotal in the development of novel consumer applications for next generation head mounted display hardware.

Index Terms: H.5.1 [[Information Interfaces and Presentation]: Multimedia Information Systems]: Artificial, augmented, and virtual realities—

*e-mail: moserk@acm.org
†e-mail: sujan.uma@gmail.com
‡e-mail: swan@acm.org

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