

Vishnu: Virtual Immersive Support for HelpiNg Users

An Interaction Paradigm for Collaborative Remote Guiding in Mixed Reality

This paper aims to ease remote collaboration by providing a local agent two additional virtual arms controlled by the remote expert. The remote expert is immersed in Virtual Reality(VR) and the local agent is helped through the Augmented Reality(AR) interface. With these two additional arms coming out of the agent's own shoulders, the remote expert can use them as interaction tools and show the exact gestures and actions to perform, as illustrated in Figure 2

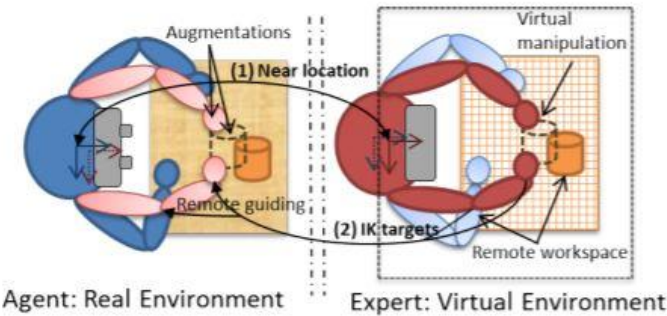


Figure 2: A conceptual top view of the *Vishnu* paradigm.

Many challenges come with this: collocation, inverse kinematics (IK), the perception of the remote collaborator, and gestures coordination. Collocate - place side by side or in a particular relation

Alem et al. developed many MR interfaces for remote collaborative maintenance. HandInAir and MobileHelper are examples of systems that provide gesture-based guidance for an agent helped by a remote expert. The agent wears a helmet with a camera that is streamed to the helper. Then, the expert acts with free mid-air gestures in front of a camera, and his hands are merged on the output display of both users. However the displays are still not truly collocated with the real environment (because of the use of a near-eye display and no tracking), and the interaction of the helper stays limited to moving his head around the position of the agent's head and to showing the gestures to perform without being able to interact with any object.

The Vishnu paradigm is based on an Inverse Kinematics algorithm with virtual targets for the elbows and hands while the shoulders are fixed regarding the agent's ones. This makes sense only if the agent is close to the expert's virtual location. The expert's arm parts (i.e. shoulders, elbows and hands) are tracked and used to control their virtual representations for proper kinematics between the expert's gestures and his interactive tools.

The only implementation with respect to our project I can think of is teaching 3D art with the help of guidance hands. In the future, if we implement something where the artist teaches art to bystanders sort of like a VR art class. However, this may be more relevant for other scenarios as well.