

Recent Advances in Telexistence

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Abstract: Telexistence is fundamentally a concept named for the technology that enables a human being to have a real-time sensation of being at a place other than where he or she actually exists, and to interact with the remote environment, which may be real, virtual, or a combination of both. It also refers to an advanced type of teleoperation system that enables an operator at the control to perform remote tasks dexterously with the feeling of existing in a surrogate robot. Although conventional telexistence systems the author proposed back in 1980 provide an operator the real-time sensation of being in a remote environment, persons in the remote environment have only the sensation that a surrogate robot is present, not the operator. Mutual telexistence aims to solve this problem so that the existence of the operator is apparent to persons in the remote environment by providing mutual sensations of presence. This enables humans to be seemingly everywhere at the same time, i.e., to be virtually ubiquitous.

This paper describes recent advances in telexistence, which fuses robotics, virtual reality and network technology. A telexistence system using RPT (Retro-reflective Projection Technology) and a humanoid robot with retro-reflective covering has been proposed and proved to be a promising approach toward the realization of mutual telexistence. Another approach is the development of TWISTER (Telexistence Wide-Angle Immersive STEReoscope), a 360-degree immersive full-color cylindrical display with stereoscopic vision without requiring specialized eyewear, designed for face-to-face telecommunication as if users exist in the same virtual 3D space.

Technology based on the concept of networked telexistence enables users to meet and talk as if they share the same space and time, even if they are far apart from each other, as a natural progression from the telephone to the telexistence-videophone.



Fig.1 Optical Camouflage using Retro-reflective Projection Technology (RPT).



Fig.2 Twister (Telexistence Wide-Angle Immersive STEReoscope) in use.