

Enhancing Realism and Communication Bandwidth Using Multisensory Cutaneous Cues

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The ability to identify and perceive the properties of objects relies on our sense of touch or more accurately active touch or haptic sensing. However, it is not only tactile cues arising from mechanoreceptors in the skin that provide us with spatial and temporal information about objects, but also signals from thermoreceptors that sense changes in skin temperature associated with contacting objects made from different materials. Tactile and thermal displays designed to replicate these sensations in virtual environments or for teleoperated robotic systems have typically focused on a single modality rather than the multisensory experience associated with object contact. In our work we have sought to understand the multisensory interactions that occur in the cutaneous senses by examining how tactile and thermal information is processed. We are particularly interested in understanding how these independent sensory systems function synergistically, given their profound differences in temporal and spatial processing.