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Conveying Vibrotactile and Thermal Sensations Through a Wearable Vibrothermal Actuators

Background Haptic technology is a novel research area that aims to stimulate the sense of touch in a user experience. Haptic displays render touch-based information, either tactile or kinesthetic or both, to users in real, augmented, or virtual environments. The ideal design for haptic displays is a wearable format due to the versatility in applications.

Existing haptic displays use various methods to generate vibrotactile inputs such as motors (e.g., linear resonant actuators, eccentric rotating mass), voice coils, and ultrasound. However, only vibrotactile motors are currently used in mainstream consumer electronics because they are inexpensive to produce and easy to control. Thermal displays, on the other hand, usually use Peltier units to produce thermal sensations. There is no currently available haptic display technology that combines both the vibrotactile and thermal elements of sensation for the user. Invention Description Researchers at Arizona State University have developed a novel array of vibrotactile actuators and thermal units affixed on a flexible casing. The combination of vibrotactile and thermal stimulations enables richer haptic communication due to better control over the generated patterns. Additionally, this device can be worn around the forearm and wirelessly controlled using a smartphone, which opens up applications in long-distance haptic communication. Potential Applications • Mobile communication (e.g., enriched messaging, video calls, notifications) • Gaming or virtual reality systems • Assistive devices for blind or visually impaired individuals • Personalized healthcare applications (e.g., feedback systems for people affected by Parkinson's disease) Research Homepage of Professor Troy McDaniel