

Translating Sound into Soft Touch for Haptic Devices

A technology that transforms inaudible sound waves into tactile pressure, providing an improved haptic feedback

A Georgia Tech inventor has developed an innovative method to provide tactile/haptic information to the user by transmitting inaudible sound waves through a sealed capsule (i.e., air pocket) made of a flexible polymer. Unlike current haptic technologies—vibromotors, magnetic coils with rigid armatures, rollers, and electro-active polymers—this patented invention is easy to incorporate into textiles and other products. The innovative mechanism uses an electromechanical or piezoelectric speaker to issue inaudible sound waves of a recorded heartbeat or other sound file stored on a compact flash memory device. The low-frequency sound waves are then transmitted through small, flexible air pockets, causing tactile/haptic actuation within other objects, such as a textile or a touch screen device. This technology emerged from a technological art project that sought to engineer a textile that would pulse according to a recorded heartbeat signal.

Summary Bullets

- **Low cost:** Uses components that are less expensive than other high-tech options
- **Better response:** Responds more quickly and more refined/granular than existing products with slow and/or coarse responsiveness
- **Enhanced performance:** Achieves a silent, smoother, pulse-like response rather than an unpleasant push or buzz

Solution Advantages

- **Low cost:** Uses components that are less expensive than other high-tech options
- **Better response:** Responds more quickly and more refined/granular than existing products with slow and/or coarse responsiveness
- **Enhanced performance:** Achieves a silent, smoother, pulse-like response rather than an unpleasant push or buzz
- **Soft, compact interface:** Embeds easily into textiles and other products requiring flexibility (e.g., textiles) or portability (e.g., computer mice)
- **Controllable:** Distributes sound wave pressure across a specifiable, localized area
- **Customizable:** Reconfigures easily to achieve a variety of distinctive tactile outputs

Potential Commercial Applications

- Apnea/SIDS therapy, heartbeat simulation, and other vibration-based soothing products for infants
- Sound-indicating devices for people who are hearing impaired
- Novelty/Fashion textiles
- Computer interfaces (e.g., touch screens, mice, game controllers)

Background and More Information

Improved haptic (i.e., touch) feedback has a wide range of applications. For example, tactile stimulation benefits infants, including premature and full-term newborns, as soothing and as a therapy for sleep apnea, which has been linked to sudden infant death syndrome (SIDS) In addition, the computer hardware industry is expanding its use of haptic feedback within touch-screen devices, mice, and gaming controls. These and other applications have had to rely on technologies with several key limitations.

Inventors

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