Translating Sound into Soft Touch for Haptic Devices (#5433)

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.

Benefits/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/Context for This Invention

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.

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More Information

Publications

For more information about this technology, please visit:
https://licensing.research.gatech.edu/technology/translating-sound-soft-touch-haptic-devices

Images:

The automated sequential delivery of multiple fluids. A varying number of delay gates imprinted in the branches are shown in the figure.

COVID-19 and flu saliva test on paper: (A) The automatic sequential delivery of multiple reagents required for virus test; (B) Water pouring into the device triggers the virus assay, allowing the presence of SARS-CoV-2 and influenza A & B viruses to be visually identified by the color changes in the corresponding detection spot