

Tactile Sensors and Flexible Tactors

Wearable Flexible Electronics and Haptic Feedback Systems

Wearable medical devices can restore somatosensory feedback in areas with reduced nerve sensitivity, improving grip control and tactile perception. They can also provide haptic alerts to unsafe pressure distributions in prosthetic sockets and offer therapeutic vibratory stimulation for mobility impairments. These devices enable wearable, customizable solutions for continuous physiological monitoring.

Researchers at Virginia Commonwealth University have introduced a novel wearable system combining flexible carbon nanotube pressure sensors with customizable vibrohaptic tactors to provide real-time somatosensory feedback through an event-cue feedback loop.

The Technology

This invention introduces a sensing-actuation platform integrating soft tactile sensors made from carbon nanotube (CNT) composites and flexible vibrotactile actuators (tactors) fabricated via advanced 3D printing techniques. The system detects mechanical stimuli on low-sensitivity body areas and transmits signals to healthy skin regions, delivering precise vibratory feedback. The sensors function by changing electrical resistance under pressure, while the tactors produce customizable vibrations through flexible cantilevers driven by electromagnetic fields. The platform supports wired or wireless (Bluetooth) connectivity, enabling applications such as grip control gloves, prosthetic socket pressure monitoring, and plantar pressure sensing for gait and Parkinson's therapy.

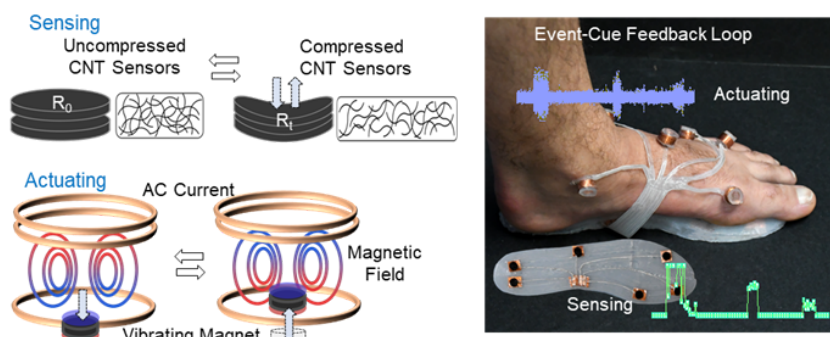


Figure 1. Flexible CNT pressure sensing pads exhibit changes in resistance when subjected to compression, tension, or flexure. Device actuation relies on an oscillating magnetic field generated by a solenoid, which drives a magnet and induces vibration.



VCU Research and Innovation

Benefits

- » Highly flexible and customizable tailored via 3D printing
- » Versatile connectivity integration and real-time feedback
- » Precise pressure sensing
- » Compact, wearable design

Applications

- » Medical rehabilitation devices
- » Wearable gloves for grip force feedback and tactile sensing enhancement
- » Prosthetic socket pressure monitoring systems
- » Smart insoles for gait analysis and therapeutic feedback
- » Somatosensory augmentation and assistive technologies

IP Status:

Provisional patent application filed

Licensing Status:

This technology is available for licensing to industry for further development and commercialization

Category:

Engineering & Physical Science

VCU Tech #:

24-024

Investigators:

Daeha Joung
Phillip Glass

Additional Information:

Contact us about this technology

Brent Fagg, MS
Assistant Director for Innovation
bfagg@vcu.edu
(804)-827-2211



VCU Research and Innovation

techtransfer.research.vcu.edu