



Science and Technology

TRANSPORTATION SECURITY & EXPLOSIVES CHARACTERIZATION

WEARABLE SENSOR FOR CONTACT-LESS PHYSICAL ASSESSMENT

TOUCHLESS SENSOR THAT ALLOWS A USER TO FEEL AN OBJECT WITHOUT TOUCHING IT.

Virtual reality (VR) technologies simulate environments that allow users to sense virtual objects and experiences. VR systems digitally immerse users through simulated sensations delivered through head-mounted displays, gloves, suits, and other wearable devices. Compared to sight, hearing, and smell, touch-based sensing is harder to replicate virtually because the hand's sensory and motor nerves are more complex than other body parts.

Researchers at the Transportation Security Administration pursued this challenge with a design for a Wearable Sensor for Contactless Physical Assessment (WSCP), a technology that would allow a user to feel an object without touching it. The innovation uses touchless sensors to register the object's contours and generate feedback to physically replicate the target object, enabling physical sensation and assessment without direct contact. The subject technology can minimize potential harm when touching unsafe objects, preserve individual privacy during a security screening, or safely provide physical awareness for visually-impaired individuals.

KEY BENEFITS

- + Preserves privacy during body scanning and pat-down screening
- + Enhances situational awareness for visually impaired individuals
- + Provides realistic virtual reality immersion
- + Elevates user safety when assessing a potentially dangerous object
- + Allows handheld and portable use in small spaces

STAGE OF DEVELOPMENT

Conceptual

PARTNERSHIP SOUGHT

License

INVENTORS

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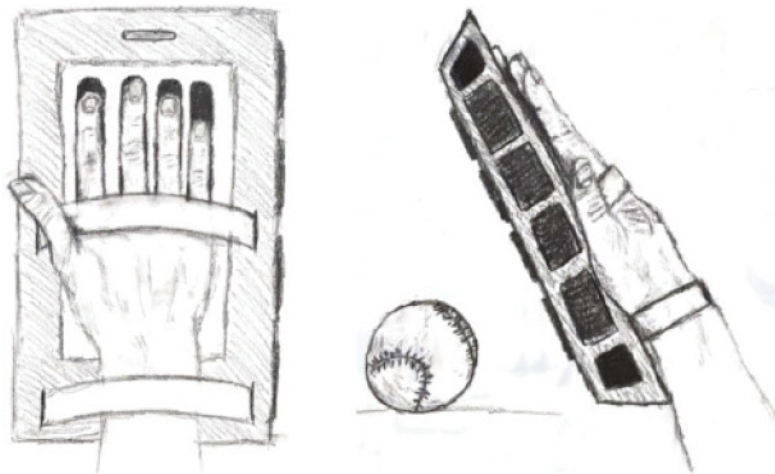
DHS COMPONENT

Transportation Security Administration

The Technology Transfer and Commercialization Branch (T2C) within the Office of Industry Partnerships (OIP) of the Department of Homeland Security (DHS) Science and Technology Directorate (S&T) serves as the centralized point to manage technology transfer activities throughout DHS and the DHS laboratory network. **T2C@hq.dhs.gov**

THE TECHNOLOGY

The proposed device is a wearable accessory that features touchless sensors, cameras, and a haptic feedback pad. The touchless sensor system could be enabled through millimeter wave scanning, light detection and ranging (LiDAR), or backscatter X-ray technology. A user fits the device over their hand. When the touchless sensors in the device are within range of the targeted object, the sensors in the pad detect the target object's contours to produce sensor data. The contour detection data runs through a mapping algorithm to produce a contour map. The contour map is then relayed to the back surface that contacts the user's hand through haptic feedback to physically simulate a sensation of the virtually detected contours in real time.



A drawing of the envisioned WSCPA device in use. A user would insert their hand into the straps of the sensor pad. When placed in front of an object, the device detects the contours of the object and relays haptic feedback to the hand to simulate the sensation of touching the object.

APPLICATIONS

The technology has several potential end users:

- + Security screening checkpoints
- + Visual impairment assistance devices
- + Virtual reality research and education systems
- + Medical examinations

PATENT INFORMATION

US Patent Application number
18/664,083

CONTACT INFORMATION

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<https://www.dhs.gov/science-and-technology/technology-transfer-program>

