Skysong Innovations
Advancing the Arizona State University Knowledge Enterprise

1475 N. Scottsdale Road, Suite 200
Scottsdale, AZ 85287-3538
Phone: 480 884 1996 Fax: 480 884 1984

Case ID:M22-063P
Published: 1/9/2023

Inventors

Troy McDaniel
Yatiraj Shetty
Shubham Gharat

Contact

Physical Sciences Team

Assistive Device to Encode Spatial Information for Blind Navigation in a Tactile Format

-Visually impaired individuals often rely on assistive devices that attempt to encode spatial information into other means such as audio or tactile signals. However, challenges in implementation and interpretation of spatial information still exist. For instance, many existing devices still provide limited information to a user that the user must extrapolate on their own, leading to a cognitive burden on the individual.

Current assistive device designs, like vests and haptic belts, cannot easily be worn snugly by the user. Having them inside an external layer of clothes may not be comfortable and wearing them externally may lead to poor tactile sensations on the user's skin. Another assistive device (i.e., a smart cane) can provide simplified vibration notifications to a user, but these notifications do not convey rich information due to a lack of surface area in contact with the user's skin. Thus, there is a need for an assistive device that enables close contact with the skin, has a high surface area to enable rich tactile notifications to the user, and is customizable per the user's needs. Additionally, from a cognitive standpoint, the rich tactile notifications should provide easy-to-understand navigation for the user.

Researchers at Arizona State University have developed an assistive device to help a user navigate their environment. The device consists of an array of vibrotactile actuators and thermal units affixed on a flexible casing. The vibrotactile actuators are used for obstacle detection and directional cues for navigation are given using the thermal units. The flexible casing could be worn on an arm of the user. Pilot testing for this device has been done using a Bluetooth-enabled smartphone app.

Potential Applications:

- Device to help people with visual disabilities navigate their environment
- Device to aid people in instances of limited visibility (e.g., in firefighting, during military operations, etc.)
- Device to be used in gaming applications (e.g., augmented reality, etc.)
- Device to enhance feedback to individuals involved in high-information-throughput professions (e.g., Formula 1 racers, fighter pilots, etc.)

Benefits and Advantages:

- Wearable (e.g., as a sleeve form factor)
- Wireless
- Easy-to-use
- Generates rich stimulation patterns thereby reducing cognitive load on the user