

Tactile & Bone Conduction Communication



S&T Campaign: Human Sciences
Human Capability Enhancement

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Research Objective

Develop a combined tactile/bone conduction (BC) device with improved sensitivity and frequency response to enhance Warfighter communications and situation awareness.



Examples of current bone conduction vibrators and tactors

Challenges

- Combine tactile/BC technologies in one small electro-mechanical device.
- Develop a mounting solution for the dual-mode device to accommodate different users, headgear, and positions on the head.



A Soldier uses a head-mounted tactile display

ARL Facilities and Capabilities Available to Support Collaborative Research

Facilities and capabilities at APG, MD include:

- Anechoic chamber and indoor/outdoor test rooms with controllable levels of background noise.
- Bone conduction calibration equipment (artificial mastoid).
- Immersive environment and outdoor facilities to test equipment for operational relevance.
- Expertise in tactile and bone conduction communication systems, speech intelligibility, and communication systems for protective gear (masks, etc.).
- *Amrein, B.E et al. (2014). Sensory perception in human research and engineering directorate: Thrust areas and recent research 2011-2014. ARL special report ARL-SR-2093. APG, MD. U.S. Army Research Laboratory.*
- *Myles, K. & Kalb, J.T. (2013). Head tactile communication: Promising technology with the design of a head-mounted tactile display. Ergonomics In Design, 21, 4-8.*
- *Pollard, K.A., Garrett, L., & Tran, P. (2014). Bone conduction systems for full-face respirators: speech intelligibility analysis. ARL Technical Report ARL-TR-6883. APG, MD, U.S. Army Research Laboratory.*
- *Tran, P.K., Letowski, T.R., & McBride, M.E. (2013). The effect of bone conduction microphone placement on intensity and spectrum of transmitted speech items. Journal of the Acoustical Society of America, 133, 3900-3908.*

Complementary Expertise/ Facilities/ Capabilities Sought in Collaboration

- Innovative research approaches and solutions in material, electronics, and mechanical design to develop a tactile/BC device.
- Develop a smart harness solution that is suitable for different head sizes and adjusts pressure at the transducer-skull interface for comfort and effectiveness.