

Low Profile, Vibrotactile EMG Feedback Device for Direct Placement on Electrode Patch

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A novel EMG feedback device has been designed and developed. The device exists in two forms: a trainer version to be used by the general consumer and a stethoscope version that is tailored to be used by a therapist or a clinician. The trainer version was designed and built to have a small form factor for direct place-

ment of the device on a disposable electrode patch, thus eliminating the need for electrode wires. The unique design allows for vibrotactile feedback in addition to standard auditory feedback. The stethoscope version provides a stethoscopelike form factor. The audio output can be either a pure tone or the sound of the EMG signal itself. The electrodes in this version consist of a reusable bar electrode containing two fixed electrodes and a reusable grounding electrode. The stethoscope version allows the user to quickly and easily hear EMG information from various locations of the body. Each of the devices provides users with capabilities and functions not previously available from traditional EMG feedback devices.

Breast Tumor Detection Instrument Through Mammography Based NIR DOT

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X-ray mammography has been used in the early detection of breast tumors for decades. Related techniques to enhance preventive screenings are still demanding. Since the 1990s, near infrared diffuse optical tomography (NIR DOT), a functional medical imaging modality, is being exploited and developed to reconstruct optical-coefficient images of tissues. Much endeavor to improve

the spatial resolution and contrast of DOT images has been exerted for clinic applications in the diagnosis of breast tumors. The study aims at the design, implementation, and verification of a mammography based NIR DOT. This multimodality imaging method is able to provide information that neither X-ray nor diffuse optical tomography can give alone. To this end, a device with multiple-channel switching of NIR sources and translational scanning of out-emitted intensity constructed on a commercialized mammography system is being designed and built up. We employ the mammography image as structure information that is used as an initial guess for the image reconstruction of optical properties of tissues. Preliminary numerical trials are performed using heterogeneous phantoms made of high-scattering Intralipid. Promising results are obtained with various spatial resolutions due to partial NIR detected intensity.