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Review of biometric classification of heart sound for continual user authentication and clinical applications

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Continual authentication using passive monitoring of sensor data is not currently available on most mobile devices. This monitoring can maintain confidence that the device owner is the current user without inconveniencing them by requiring frequent re-authentication, for example with password, swipe, or fingerprint. Biometrics used for passive monitoring do not currently include heart sound, which is an interesting choice because it is constantly available, hard to obtain from another person, and has been shown to be reasonably unique between individuals. Clinical cardiology applications currently do not take advantage of the algorithms of heart sound authentication, for example, to indicate a change in the patient's heart sound on an in-home wearable mobile device app. This research explores the biometric of heart sound for use in passive and continual screening for clinical applications, and for user authentication. Using the heart sound biometric for a cardiac patient allows passive monitoring of sensor data, screening changes in heart sound. Changes from baseline data trigger an alert to the user and caregiver. For user authentication, passive monitoring maintains confidence that the device owner is the current user without inconveniencing users by asking them to re-authenticate to access high security applications. Prior heart sound research is extended for potentially greater user authentication accuracy in the areas of time windows, number of heartbeats, feature vectors, classifiers, sample selection, and noise mitigation. Application and adaptation of user authentication methodologies from speech processing are applied. The methodology can be extended to work with different public and private heartsound datasets.

Biography

Leigh Anne H Clevenger is a candidate of Doctor in Professional Studies in Computing at Pace University. As a Software Engineer at IBM in Poughkeepsie, NY. She has developed solutions for advanced technology microprocessor design for six technology generations. She has nine submitted patents in the area of wearables and healthcare. She was an invited speaker at the 2015 Pace University Cybersecurity Workshop.

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