A Noise Cancellation Scheme for Wearable Non-Contact Sensors for ECG, EEG and Other Biopotential Monitoring

Tech ID: 23396 / UC Case 2013-331-0

BACKGROUND

Wearable non-contact sensing system to monitor biopotentials is challenged with the artifacts of physical motion between the body and the sensor. Such signal artifacts impair the clear capture of biological signals and limit the potential applications of such systems.

TECHNOLOGY DESCRIPTION

UCSD researchers have developed a technology to suppress the motion artifacts typically encountered in the non-contact sensing system. Specifically, a sensor that consists of a pair of physically-interleaved capacitive channels is designed to have different amounts of parasitic input capacitance, creating channel-specific outputs that depend on the input coupling capacitance itself. Differences in output channel results can then be placed through a digital reconstruction filter to re-create the original biopotential with attenuated motion artifacts. This novel technology enables a more reliable and robust non-contact sensing platform for a variety of wearable health monitoring applications, such as EEG, ECG, EMG.

ADVANTAGES

The medical instrumentation incorporating this technology enables easy-to-use non-contact real time monitoring of subject's biopotential parameters without the associated disadvantages of conventional wet electrodes, while addressing critically important motion artifact concerns.

APPLICATIONS

Mobile and wearable non-contact biopotential monitoring system, for long-term and/or ambulatory uses in either clinical or non-clinical settings, for example, EEG, ECG, and EMG monitoring.

STATE OF DEVELOPMENT

A wireless ECG sensing system is designed to validate the system concept. Simulation results indicate that motion-induced signal distortion is reduced by over 14X after reconstruction.

RELATED MATERIALS

▶ Su, Haibing ; Liu, Hao ; Weng, Shih-Hung ; Wang, Hui ; Presswala, Aliasgar ; Zhuang, Hao ; Lin, Jeng-Hau ; Mercier, Patrick ; Cheng, Chung-Kuan A non-contact biopotential sensing system with motion artifact suppression. Communications, Circuits and Systems (ICCCAS), 2013 International Conference on Volume: 2 Digital Object Identifier: 10.1109/ICCCAS.2013.6765345 2013 , P. 314 – 318 - 11/15/2013

INTELLECTUAL PROPERTY INFO

Available for development into commercial applications.

PATENT STATUS

Country	Type	Number	Dated	Case
Patent Cooperation Treaty	Reference for National Filings	2015061282	04/30/2015	2013-331

Patent Pending

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OTHER INFORMATION

KEYWORDS

Biosensor, non-contact sensor, personal medicine, mobile, wearable, EEG, ECG, EMG, noise cancelation, motion artifacts

CATEGORIZED AS

- **Sensors & Instrumentation**
  - Biosensors
- **Engineering**
  - Other

RELATED CASES

2013-331-0

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