Method and System for Signal Separation in Wearable Sensors with Limited Data (with Applications to Transabdominal Fetal Oximetry)

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CONTACT

Andrew M. Van Court
amvancourt@ucdavis.edu
tel: .

INVENTORS

- Ghiasihafezi, Soheil
- Saffarpour, Mahya

OTHER INFORMATION

KEYWORDS

blood glucose monitoring, deep harmonic neural network, fetal oximetry, non-invasive fetal monitoring, quasi-periodic signals, signal processing, signal separation, tissue oximetry, wearable health devices, wearable systems

CATEGORIZED AS

- **Biotechnology**
  - Health
- **Engineering**
  - Engineering
- **Medical**

ABSTRACT

Researchers at the University of California, Davis have developed method for separating quasi-periodic mixed-signals using a single data trace, enhancing wearable sensor applications.

FULL DESCRIPTION

Deep Harmonic Finesse (DHF) is a method designed to address the challenges of separating quasi-periodic, non-stationary signals from a single mixed signal input. This technology is pivotal for wearable systems where collecting large datasets is impractical. By leveraging deep harmonic neural networks and a pattern alignment method, DHF can isolate target signals from noise and other quasi-periodic phenomena, leveraging prior knowledge of time-frequency patterns. This approach is particularly beneficial in applications such as tissue oximetry and blood glucose monitoring, where accurate signal separation can significantly enhance the reliability of sensor readings.

APPLICATIONS

- Wearable health monitors for blood glucose levels, tissue oximetry, and more.
- Non-invasive fetal monitoring and other deep tissue sensing applications.
- Signal processing solutions where data collection is challenging or impractical.

FEATURES/BENEFITS

- Enables signal separation using only a single data trace, overcoming the need for large datasets.
- Addresses the overlap of signal frequencies, a limitation of traditional frequency-based filtering techniques.
- Incorporates a deep harmonic neural network with pattern alignment for improved signal accuracy.
- Significantly improves signal-to-distortion ratio and mean squared error compared to existing methods.
- Enhances the reliability of wearable sensor applications in healthcare, such as non-invasive fetal monitoring.
- Separates quasi-periodic signals in the presence of frequency overlap and limited data availability.
- Accurately detects physiological parameters in wearable systems amidst noisy and complex signal environments.
- Reduces the need for extensive data collection in wearable healthcare monitoring systems.

PATENT STATUS

Patent Pending

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- Accurate, Non-Invasive Fetal Arterial Oxygen Saturation and Blood Ph Measurement via Diffuse Optics
- Fetal Oximetry Measurement via Maternal Transabdominal Spectroscopy

- Devices
- Diagnostics
- **Nanotechnology**
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University of California, Davis

Technology Transfer Office

1 Shields Avenue, Mrak Hall 4th Floor,

Davis,CA 95616

Tel:

530.754.8649

techtransfer@ucdavis.edu

https://research.ucdavis.edu/technology-transfer/

Fax:

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