

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
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non-invasive fetal
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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

- ▶ [TransPPGSep: Fetal Signal Separation using Physically and Physiologically Compliant Synthetic Data](#)
- ▶ [Accurate, Non-Invasive Fetal Arterial Oxygen Saturation and Blood Ph Measurement via Diffuse Optics](#)
- ▶ [Fetal Oximetry Measurement via Maternal Transabdominal Spectroscopy](#)

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