



## Systems and Methods for Non-Contact Monitoring of Physiological Parameters

AzTE Cases: M13-129L, M16-083L, M16-085L & M17-008L

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### Publications:

[Shao et al – IEEE Trans Biomed Eng - 2014](#)  
[Shao et al – IEEE Trans Biomed Eng - 2016](#)  
[Shao et al – IEEE Trans Biomed Eng - 2016](#)

### Intellectual Property

#### Status:

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 Patents Pending

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### Invention Description

Vital signs are critical for the diagnosis and management of various diseases. With the advent, availability and portability of electronic devices such as cell phones, new opportunities for monitoring vital signs are becoming increasingly realized. Unfortunately, most current systems which monitor vital signs suffer from low frequency noise and unwanted body movement.

Researchers at the Biodesign institute of Arizona State University have developed a portfolio of systems for non-contact and non-invasive monitoring and tracking of vital physiological parameters of the human body. The physiological parameters include breathing rate, breathing amplitude, exhaled volume flow rate, heart rate, face paleness, ballistocardiogram (BCG) and photoplethysmogram (PPG) signals, blood pressure and oxygen saturation (SpO<sub>2</sub>). In one system, specific regions of the body can be monitored and used to determine and track breathing patterns. In another system, a video-based noncontact method monitors SpO<sub>2</sub> using a camera and dual-wavelength imaging system. A third system uses optical imaging devices to simultaneously and non-invasively measure BCG and PPG from the same body part, and also extract blood pressure of the subject. These systems can use existing electronic devices, so that the user does not have to purchase, carry and maintain additional devices. They would also find great utility in hospital or clinician settings.

These unique systems can take these parameters and allow a user to measure and track their vital signs and changes to their vital signs under free-living conditions such as during regular or routine activity. These systems would also find great utility in doctors' offices or hospital settings.

### Potential Applications

- Physiological parameter tracking for health monitoring and disease detection
  - Breathing rate, breathing amplitude, exhaled volume flow rate, heart rate, face paleness and oxygen saturation, BCG, PPG, Blood pressure
  - Can be utilized with mobile devices such as cell phones or tablets, as well computers

### Benefits and Advantages

- Non-contact and non-invasive
- Can be used in free-living conditions such as during regular/routine activity
- Overcomes problems of low frequency noise & body movement/motion induced artifacts
- Low cost
- Can measure BCG and PPG from the same area of the body, making it more amenable to using a single optical imaging device
- Does not require the subject to wear any special devices