

# Wearable Technology for Cardiovascular Activity

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## **A non-invasive detection method for cardiovascular activity for central and peripheral cardiovascular activity using BCG**

Inventors at Georgia Tech have developed a non-invasive detection method for central and peripheral cardiovascular activity using BCG. The method estimates center-of-mass BCG, a measure of the displacement of the body's center of mass, with an accelerometer placed on the surface of the skin and a simultaneously-acquired electrocardiogram. The accelerometer could be placed on most areas of the body including the wrist (smart watch), arm (smartphone armband), chest (chest strap) or forehead (headband). The method has been demonstrated in measuring central hemodynamic force from the wrist. Measuring central hemodynamic forces from distal locations on the body, such as the wrist, could enable cuff-less blood pressure measurement from pulse-transit time and beat-by-beat wearable hemodynamics assessment.

### **Summary Bullets**

- Non-invasive measure of cardiac function through wearable ballistocardiography
- Regular measurements of systolic time intervals during normal daily activities
- Could be used in harsh environmental conditions including underwater

### Solution Advantages

- Non-invasive measure of cardiac function through wearable ballistocardiography
- Regular measurements of systolic time intervals during normal daily activities
- Could be used in harsh environmental conditions including underwater
- Designed to combine measurements from sensors placed on more than one location on the body

### Potential Commercial Applications

- Wearable devices- fitness devices, smart watches, chest straps, headbands

### Background and More Information

Cardiovascular disease is responsible for one in every four deaths in the US, with almost half of all cardiac deaths occurring outside of the hospital. Continuous heart monitoring has the potential to improve the quality of life for individuals with cardiovascular disease and potentially enable early detection and preventative care. Ballistocardiography (BCG) is a non-invasive method of measuring small movements of the body induced by

the heartbeat. BCG has been demonstrated more recently to measure pre-ejection period, a important metric related to cardiac contractility that can be applied to heart failure monitoring.

## Inventors

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## IP Status

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## Publications

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## Images



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