Docket #: S17-441

BodyNET: Sensor System for wearable electronics

Stanford researchers at the Bao Research Group have patented a body area sensor network (bodyNET) that can be used to monitor human physiological signals for next-generation personalized healthcare. BodyNET is composed of chip-free and battery-free stretchable on-skin sensor tags that are wirelessly linked to flexible readout circuits attached to textiles.

Graphical Abstract

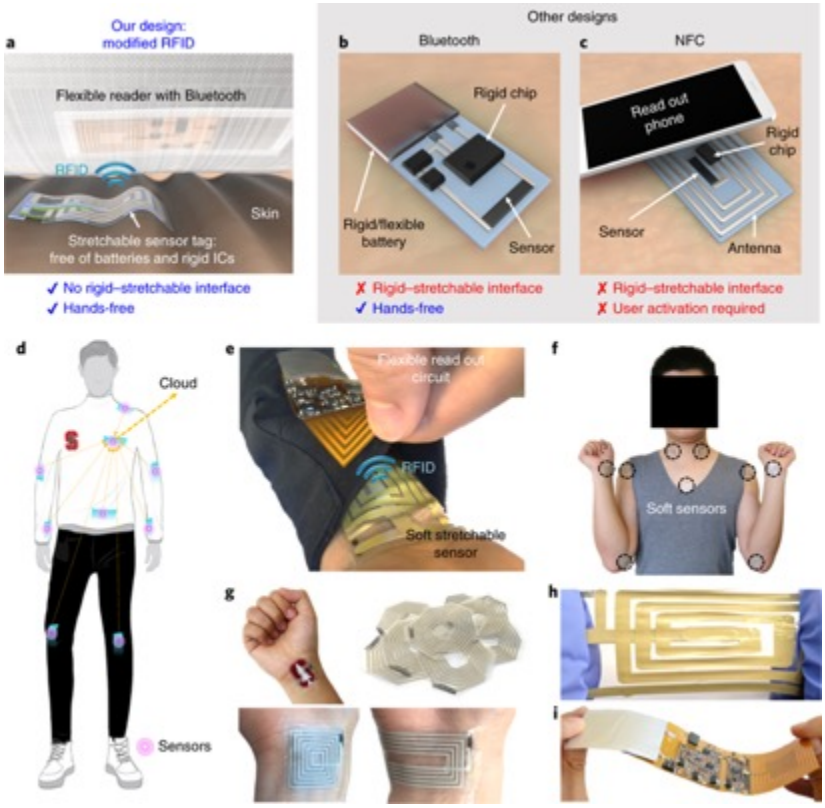


Figure description - a Schematic to describe a sensor node that thoroughly eliminates the interconnect between rigid and soft components. A stretchable sensor is conformably attached on skin and collects the signals. The information is

wirelessly read out by a flexible printed circuit board (FPCB) initiator on clothing. **b,c,** Schematics for conventional Bluetooth (b) and NFC (c) designs that have been developed previously for wearable sensors. **d,** Design concept of the bodyNET. **e,** Photograph of one sensor node for sensing the pulse on a human wrist. **f,** Photo of a person wearing multiple skin sensors. g, Photograph of on-skin sensors with different designs. **h,** Photo of a stretched target. **i** Photo of a bent FPCB initiator.

Image credit: Bao Research Group

Stage of Development

- **Tested Prototype**
- Demonstrated that the flexible bodyNET system can be used to simultaneously and continuously analyze a person's pulse, breath and body movement

Stanford News Article,
"Stanford engineers have developed wireless sensors that stick to the skin to track our health" August 16, 2019

Related Technologies
Stanford Docket S19-292 "Stretchable multi-sensor tag for wearable electronics"
Stanford Docket S19-032 "Coupling Insensitive compact reader for fully-passive sensors"

Applications

- Wearable electronics for health monitoring or other skin sensing
- Internet-of-things (IoT)

Advantages

- Batteryless, chipless and wireless on-skin sensor tag for wearable electronics
- Low power requirements
- Uses novel RFID/NFC technology
- Receiver and transmitter can be close together
- Can operate on multiple frequencies
- Platform has many possible variations
- Novel features:

- First intrinsic stretchable NFC wireless sensor tag on skin
- First intrinsic NFC stretchable antenna
- First intrinsic stretchable nF level capacitor
- First hybrid design of flexible circuit board and intrinsic stretchable tag

Publications

- Niu, Simiao, Naoji Matsuhisa, Levent Beker, Jinxing Li, Sihong Wang, Jiechen Wang, Yuanwen Jiang et al. "A wireless body area sensor network based on stretchable passive tags." Nature Electronics (2019): 1-8.

Patents

- Issued: 10,635,868 (USA)

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