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Impact Energy Harvesters for Self-Powered Wrist-Worn Wearables

Communications & Information

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Computer/AI/Data Processing and Information Technology

Digital Broadcasting, Telecommunication and Optoelectronics

Sensors

Opportunity

Smart electronic devices worn on the wrist, such as smartwatches, are becoming increasingly popular. They have multiple functions, ranging from health to security and fashion. However, conventional wearable devices are usually powered by electrochemical batteries, which threaten human health and the environment. As an alternative, academics and practitioners are using energy harvesting technology to develop self-powered smart wearable devices However, it is difficult to extract energy from the motions of the human body, due to their low frequency and large amplitude. Tackling this problem, this invention harvests kinetic energy from users' wrist motions to power wearable devices.

IP Status
Patent filed

Technology Readiness Level (TRL) 5

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Technology

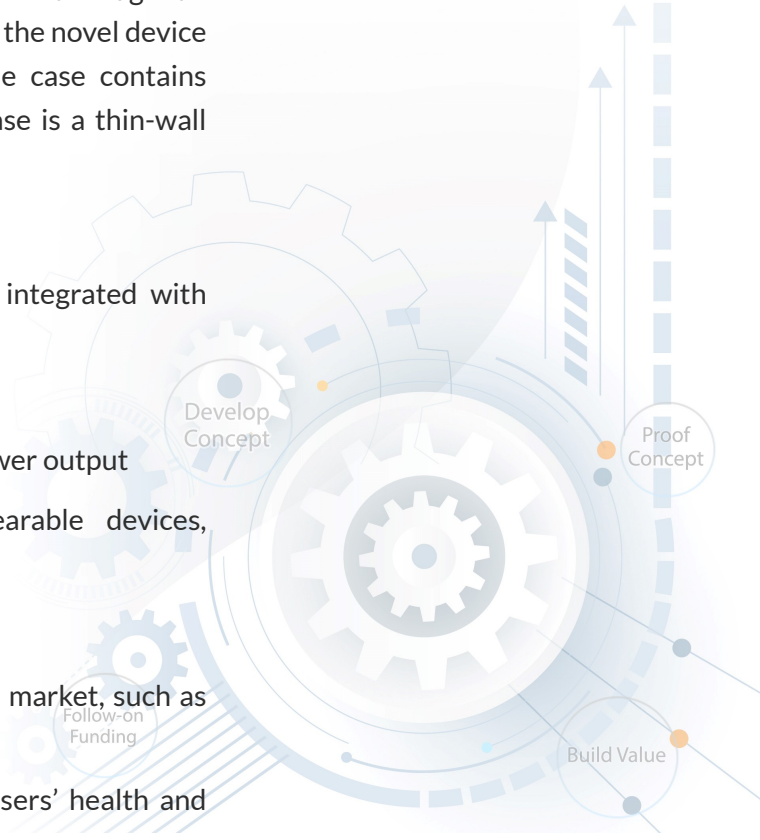
An impact energy harvester powers wrist-worn electronic devices such as smartwatches. It converts kinetic energy from users' physical motions into electrical energy via the direct piezoelectric effect and/or electromagnetic induction. Unlike commercial smartwatches and wristbands, the novel device comprises a movable case and a fixed case. The movable case contains functional units such as a screen and sensors. The fixed case is a thin-wall cuboid or cylinder made of metal, plastic or polymer.

Advantages

- Small and lightweight; can be easily and inexpensively integrated with wearables such as smartwatches
- Renewable alternative to electrochemical batteries
- High vibration-to-electricity conversion efficiency and power output
- Creates self-powered, wireless and autonomous wearable devices, avoiding the inconvenience of frequent recharging

Applications

- Applications in the rapidly growing consumer electronics market, such as smartwatches and activity trackers
- Wearable healthcare technology that collects data on users' health and exercise.



- Fashion industry (smart/intelligent textiles and clothing)