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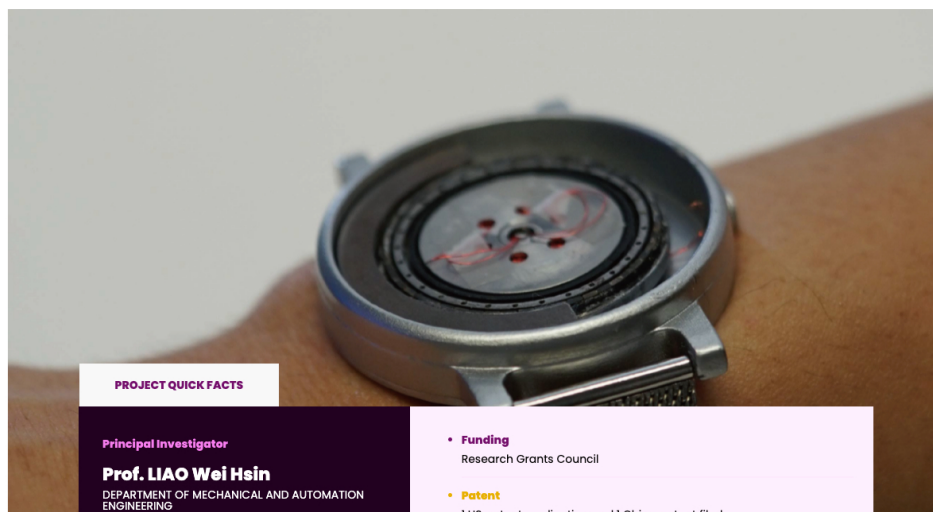
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Self-Powered Smart Watch and Wristband Enabled by Embedded Generator

#2020

#Award

#Energy



PROJECT QUICK FACTS

Principal Investigator

Prof. LIAO Wei Hsin

DEPARTMENT OF MECHANICAL AND AUTOMATION
ENGINEERING

Funding

Research Grants Council

Patent

1 US patent application and 1 China patent filed

Award

Gold Medal, International Exhibition of Inventions Geneva 2021

The limited battery life of smart watches and wristbands remains a pain point. We designed an embedded and compact electromagnetic generator so that these wearable gadgets can be self-powered. Applications include pedometer, sleep monitoring and GPS. Unlike existing products, the invention uses a novel magnetic frequency-up converter and harnesses the kinetic energy of human motion. A converter transforms the low-frequency arm swing to achieve desirable output power.

Uniqueness and Competitive Advantages:

- 4x output power and 10x power density compared with existing technologies
- Improves energy conversion efficiency by eliminating mechanical friction
- Avoid damage caused by impact force, saving maintenance or replacement
- Compact and easily embedded in variety of wearable electronics

Self powered smart watch and wristband enabled by embedded generator

What Can Smart Watch/Band Do?

Amazfit Bip
(0.65 mW)

Aliwear M2s
(1.33 mW)

Honor Band
(1.11 mW)

Fitbit Charge
(1.71 mW)

SMA-Band
(1.51 mW)

Mi Band 3
(0.91 mW)

[Watch on YouTube](#)



Shoulder joint

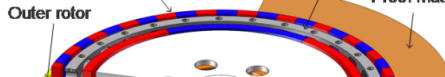
Hand

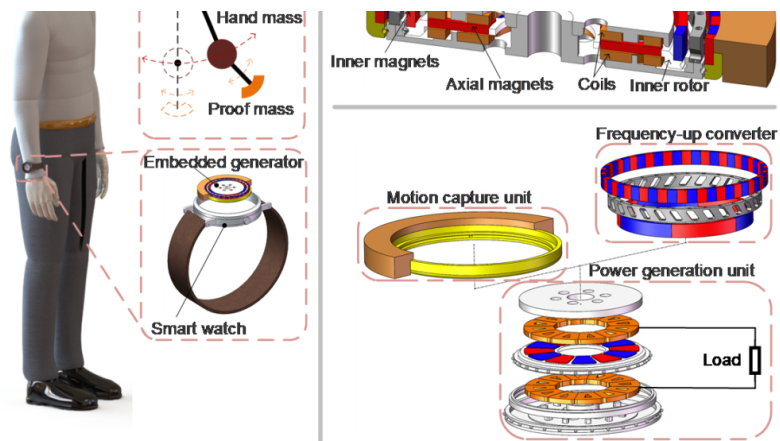
Outer rotor

Outer magnets

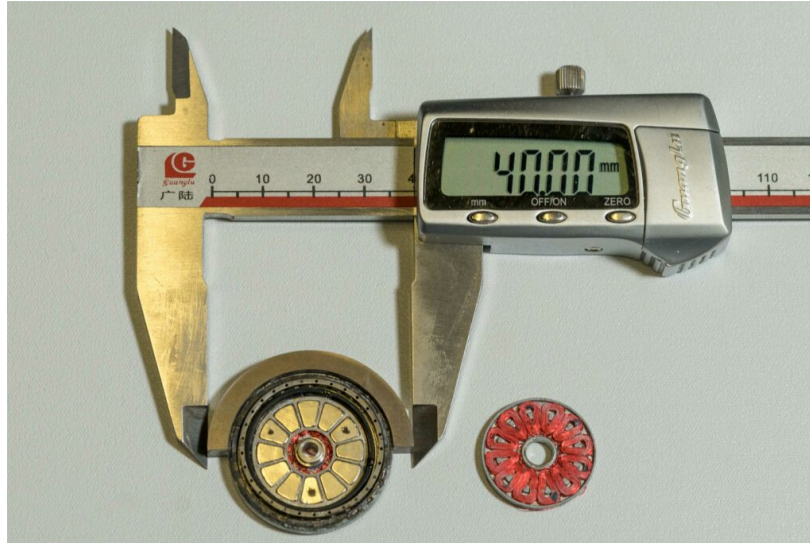
Ferromagnetic blocks

Proof mass

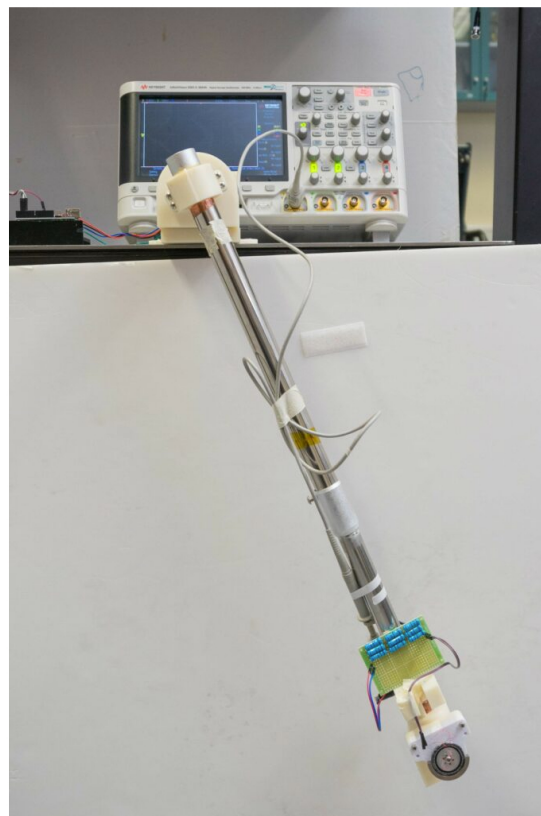




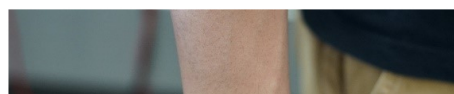
Principle and design of the embedded generator



Front view of the prototype



Prototype tested in lab





Prototype embedded in a watch case

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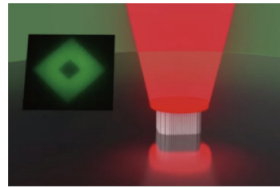
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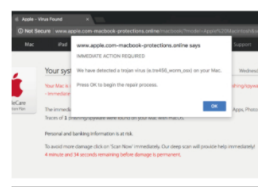
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