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Rotational piezoelectric energy harvester for wearable devices

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Abstract

Electronic devices are mostly powered externally via batteries. The dependency on the recharging process limits the usage of these devices to work in a specified period of time. This research work highlights the capability of a piezoelectric energy harvester to generate sufficient electricity to power up electronic devices by using low frequency vibrations alone, without relying on external power supplies. In general human motions consists of low frequency vibrations, therefore the capability to power up electronic devices using low frequency vibrations will also eventually become useful to power up wearable devices. Simulations were conducted using COMSOL Multiphysics (R) to identify the dimensions of a piezoelectric beam which will produce the optimum level of voltage output. A specially fabricated rotational piezoelectric energy harvester prototype that consists of a 40 mm piezoelectric bimorph beam that rotates with the aid of a rotor and aluminum proof-mass was developed together with a corresponding Arduino Uno based data logger. With a given input frequency of 18 Hz, the maximum voltage output that could be generated was recorded at 0.024 V. This research high-lights the optimistic possibility that clean energy could be generated and utilized in powering various applications without depending on external power supplies.

Keywords

Author Keywords: [energy harvester](#); [piezoelectric](#); [wearable devices](#)

KeyWords Plus: [SENSOR](#); [HEALTH](#); [MOTION](#); [MEMS](#)

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Cited References: 25**Showing 25 of 25** [View All in Cited References page](#)*(from Web of Science Core Collection)*

- | | | |
|-----|---|------------------------|
| 1. | Title: [not available]
Group Author(s): Apple Inc
APPL WATCH SER 2 TEC Published: 2017 | Times Cited: 1 |
| 2. | A Ring-Shaped Photodiode Designed for Use in a Reflectance Pulse Oximetry Sensor in Wireless Health Monitoring Applications
By: Duun, Sune Bro; Haahr, Rasmus G.; Birkelund, Karen; et al.
IEEE SENSORS JOURNAL Volume: 10 Issue: 2 Pages: 261-268 Published: FEB 2010 | Times Cited: 16 |
| 3. | Title: [not available]
By: Graham, Brian Barkley.
Using an Accelerometer Sensor to Measure Human Hand Motion Published: May 11, 2000
©
Publisher: Department of Electrical Engineering and Computer at the Massachusetts Institute of Technology | Times Cited: 4 |
| 4. | An Electronic Patch for Wearable Health Monitoring by Reflectance Pulse Oximetry
By: Haahr, Rasmus G.; Duun, Sune B.; Toft, Mette H.; et al.
IEEE TRANSACTIONS ON BIOMEDICAL CIRCUITS AND SYSTEMS Volume: 6 Issue: 1 Pages: 45-53 Published: FEB 2012 | Times Cited: 38 |
| 5. | Piezoelectric energy harvester using impact-driven flexible side-walls for human-limb motion
By: Halim, Miah Abdul; Park, Jae Yeong
MICROSYSTEM TECHNOLOGIES-MICRO-AND NANOSYSTEMS-INFORMATION STORAGE AND PROCESSING SYSTEMS Volume: 24 Issue: 5 Pages: 2099-2107 Published: MAY 2018 | Times Cited: 3 |
| 6. | Power Optimization by Mass Tuning for MEMS Piezoelectric Cantilever Vibration Energy Harvesting
By: Jia, Yu; Seshia, Ashwin A.
JOURNAL OF MICROELECTROMECHANICAL SYSTEMS Volume: 25 Issue: 1 Pages: 108-117 Published: FEB 2016 | Times Cited: 18 |
| 7. | Dynamic Computation Offloading for Low-Power Wearable Health Monitoring Systems
By: Kalantarian, Haik; Sideris, Costas; Mortazavi, Bobak; et al.
IEEE TRANSACTIONS ON BIOMEDICAL ENGINEERING Volume: 64 Issue: 3 Pages: 621-628 Published: MAR 2017 | Times Cited: 2 |
| 8. | Piezoelectric MEMS for energy harvesting
By: Kim, Sang-Gook; Priya, Shashank; Kanno, Isaku
MRS BULLETIN Volume: 37 Issue: 11 Pages: 1039-1050 Published: NOV 2012 | Times Cited: 93 |
| 9. | A soft, wearable microfluidic device for the capture, storage, and colorimetric sensing of sweat
By: Koh, Ahyeon; Kang, Daeshik; Xue, Yeguang; et al.
Science Translational Medicine Volume: 8 Issue: 366 Article Number: 366ra165 Published: NOV 23 2016 | Times Cited: 52 |
| 10. | Design and characterisation of a piezoelectric knee-joint energy harvester with frequency up-conversion through magnetic plucking
By: Kuang, Yang; Yang, Zhihao; Zhu, Meiling | Times Cited: 2 |

SMART MATERIALS AND STRUCTURES Volume: 25 Issue: 8 Article Number: 085029 Published: AUG 2016

11. **Low Power Multimode Electrochemical Gas Sensor Array System for Wearable Health and Safety Monitoring** **Times Cited: 23**
By: Li, Haitao; Mu, Xiaoyi; Yang, Yuning; et al.
IEEE SENSORS JOURNAL Volume: 14 Issue: 10 Pages: 3391-3399 Published: OCT 2014
12. **High Figure of Merit Nonlinear Microelectromagnetic Energy Harvesters for Wideband Applications** **Times Cited: 4**
By: Mallick, Dhiman; Amann, Andreas; Roy, Saibal
JOURNAL OF MICROELECTROMECHANICAL SYSTEMS Volume: 26 Issue: 1 Pages: 273-282 Published: FEB 2017
13. **Maximizing Lifetime in Wireless Sensor Network for Structural Health Monitoring With and Without Energy Harvesting** **Times Cited: 6**
By: Mansourkiaie, Fatemeh; Ismail, Loay Sabry; elfouly, Tarek Mohamed; et al.
IEEE ACCESS Volume: 5 Pages: 2383-2395 Published: 2017
14. **ScAIN MEMS Cantilevers for Vibrational Energy Harvesting Purposes** **Times Cited: 6**
By: Mayrhofer, P. M.; Rehlendt, C.; Fischeneder, M.; et al.
JOURNAL OF MICROELECTROMECHANICAL SYSTEMS Volume: 26 Issue: 1 Pages: 102-112 Published: FEB 2017
15. **Energy harvesting from human and machine motion for wireless electronic devices** **Times Cited: 813**
By: Mitcheson, Paul D.; Yeatman, Eric M.; Rao, G. Kondala; et al.
PROCEEDINGS OF THE IEEE Volume: 96 Issue: 9 Pages: 1457-1486 Published: SEP 2008
16. **A wearable piezoelectric rotational energy harvester** **Times Cited: 1**
By: Pillatsch, P.; Yeatman, E. M.; Holmes, A. S.
2013 IEEE INT C BOD Issue: 1 Published: 2013
17. **A scalable piezoelectric impulse-excited energy harvester for human body excitation** **Times Cited: 39**
By: Pillatsch, P.; Yeatman, E. M.; Holmes, A. S.
SMART MATERIALS AND STRUCTURES Volume: 21 Issue: 11 Article Number: 115018 Published: NOV 2012
18. **A piezoelectric frequency up-converting energy harvester with rotating proof mass for human body applications** **Times Cited: 61**
By: Pillatsch, Pit; Yeatman, Eric M.; Holmes, Andrew S.
SENSORS AND ACTUATORS A-PHYSICAL Volume: 206 Pages: 178-185 Published: FEB 1 2014
19. **Low-profile and wearable energy harvester based on plucked piezoelectric cantilevers** **Times Cited: 1**
By: Pozzi, M.; Almond, H. J.; Leighton, G. J.; et al.
P SPIE Volume: 9517 Published: 2015
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20. **Study of effect on resonant frequency of piezoelectric unimorph cantilever for energy harvesting .** **Times Cited: 1**
By: Prakash, G. R.; Swamy, K. M. V.; Huddar, S.; et al.
COMS C BANG Published: 2012
[\[Show additional data\]](#)
21. **A Wearable Sensor for Measuring Sweat Rate** **Times Cited: 43**
By: Salvo, Pietro; Di Francesco, Fabio; Costanzo, Daniele; et al.
IEEE SENSORS JOURNAL Volume: 10 Issue: 10 Pages: 1557-1558 Published: OCT 2010
22. Title: [not available] **Times Cited: 1**
Group Author(s): Seiko Watch Cooperation
Our clean energy watches - kinetic Published: 2017
23. **Wearable Wireless Health Monitoring** **Times Cited: 44**
By: Soh, Ping Jack; Vandenbosch, Guy A. E.; Mercuri, Marco; et al.
IEEE MICROWAVE MAGAZINE Volume: 16 Issue: 4 Pages: 55-70 Published: MAY 2015

24. **Optimization of inertial micropower generators for human walking motion** **Times Cited: 86**
By: von Buren, T; Mitcheson, PD; Green, TC; et al.
IEEE SENSORS JOURNAL Volume: 6 Issue: 1 Pages: 28-38 Published: FEB 2006
25. **Design and Performance of an Optimal Inertial Power Harvester for Human-Powered** **Times Cited: 27**
By: Yun, Jaeseok; Patel, Shwetak N.; Reynolds, Matthew S.; et al.
IEEE TRANSACTIONS ON MOBILE COMPUTING Volume: 10 Issue: 5 Pages: 669-683 Published: MAY 2011

Showing 25 of 25 [View All in Cited References page](#)