Document details

Back to results | 1 of 1

Export Download Print E-mail Save to PDF Add to List More...

Full Text View at Publisher

Cogent Engineering Open Access
Volume 5, Issue 1, 1 January 2018, Article number 1430497

Rotational piezoelectric energy harvester for wearable devices (Article)

Mohamad Hanif, N.H.H., Jazlan Mohaideen, A., Azam, H., Rohaimi, M.E.

Smart Structures, Systems and Control Laboratory (S3C RL), Kulliyyah of Engineering, International Islamic University Malaysia, Kuala Lumpur, Malaysia

Abstract

View references (25)

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® 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 highlights the optimistic possibility that clean energy could be generated and utilized in powering various applications without depending on external power supplies.

Reaxys Database Information

View Compounds

Author keywords

energy harvester piezoelectric wearable devices

Funding details

Funding number	Funding sponsor	Acronym	Funding opportunities
RIGS16-071-0235	International Islamic University Malaysia	IIUM	

Funding text

This work was supported by the IIUM Research Initiative Grant Scheme [RIGS16-071-0235].

ISSN: 23311916
Source Type: Journal
Original language: English
DOI: 10.1080/23311916.2018.1430497
Document Type: Article
Publisher: Cogent OA

References (25)

View in search results format

All Export Print E-mail Save to PDF Create bibliography

1 (2017) *Apple watch series 2 - technical specifications*. Cited 2 times.

2 Duun, S.B., Haahr, R.G., Birkelund, K., Thomsen, E.V.
A ring-shaped photodiode designed for use in a reflectance pulse oximetry sensor in wireless health monitoring applications
(2010) *IEEE Sensors Journal*, 10 (2), art. no. 5361364, pp. 261-268. Cited 27 times.
doi: 10.1109/JSEN.2009.2032925
View at Publisher

3 Graham, B.B.
(2000) *Using an accelerometer sensor to measure human hand motion*. Cited 16 times.
Massachusetts Institute of Technology,. Retrieved from
http://www-mtl.mit.edu/researchgroups/MEngTP/Graham_Thesis.pdf

4 Haahr, R.G., Duun, S.B., Toft, M.H., Belhage, B., Larsen, J., Birkelund, K., Thomsen, E.V.
An electronic patch for wearable health monitoring by reflectance pulse oximetry
(2012) *IEEE Transactions on Biomedical Circuits and Systems*, 6 (1), art. no. 6026927, pp. 45-53. Cited 45 times.
doi: 10.1109/TBCAS.2011.2164247
View at Publisher

5 Halim, M.A., Park, J.Y.
Piezoelectric energy harvester using impact-driven flexible side-walls for human-limb motion
(2018) *Microsystem Technologies*, 24 (5), pp. 2099-2107. Cited 3 times.
http://www.springerlink.com/content/0946-7076
doi: 10.1007/s00542-016-3268-6
View at Publisher

6 Jia, Y., Seshia, A.A.
Power Optimization by Mass Tuning for MEMS Piezoelectric Cantilever Vibration Energy Harvesting
(2016) *Journal of Microelectromechanical Systems*, 25 (1), art. no. 7323799, pp. 108-117. Cited 20 times.
doi: 10.1109/JMEMS.2015.2496346
View at Publisher

7 Kalantarian, H., Sideris, C., Mortazavi, B., Alshurafa, N., Sarrafzadeh, M.
Dynamic Computation Offloading for Low-Power Wearable Health Monitoring Systems
(2017) *IEEE Transactions on Biomedical Engineering*, 64 (3), art. no. 7471450, pp. 621-628. Cited 3 times.
http://ieeexplore.ieee.org/xpl/RecentIssue.jsp?reload=true&punumber=10
doi: 10.1109/TBME.2016.2570210
View at Publisher

8 Kim, S.-G., Priya, S., Kanno, I.
Piezoelectric MEMS for energy harvesting
(2012) *MRS Bulletin*, 37 (11), pp. 1039-1050. Cited 106 times.
doi: 10.1557/mrs.2012.275
View at Publisher