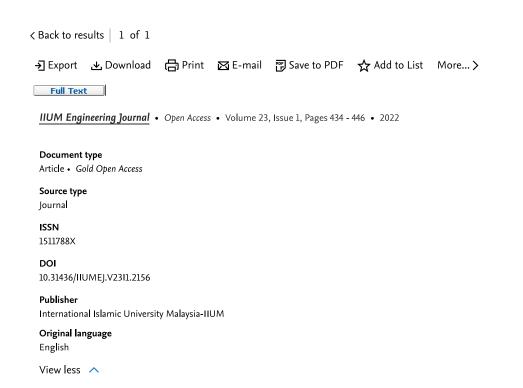


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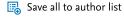
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MAXIMIZING OUTPUT VOLTAGE OF A PIEZOELECTRIC ENERGY HARVESTER VIA BEAM DEFLECTION METHOD FOR LOW-FREQUENCY INPUTS

<u>Tahir M.S.M.</u>, <u>Hanif N.H.H.M.</u> ⊠ , <u>Wahid A.N.</u>



^a Department of Mechatronics Engineering, International Islamic University Malaysia, Jalan Gombak, Kuala Lumpur, 53100, Malaysia



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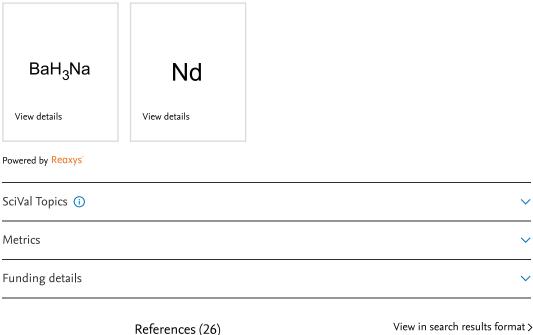
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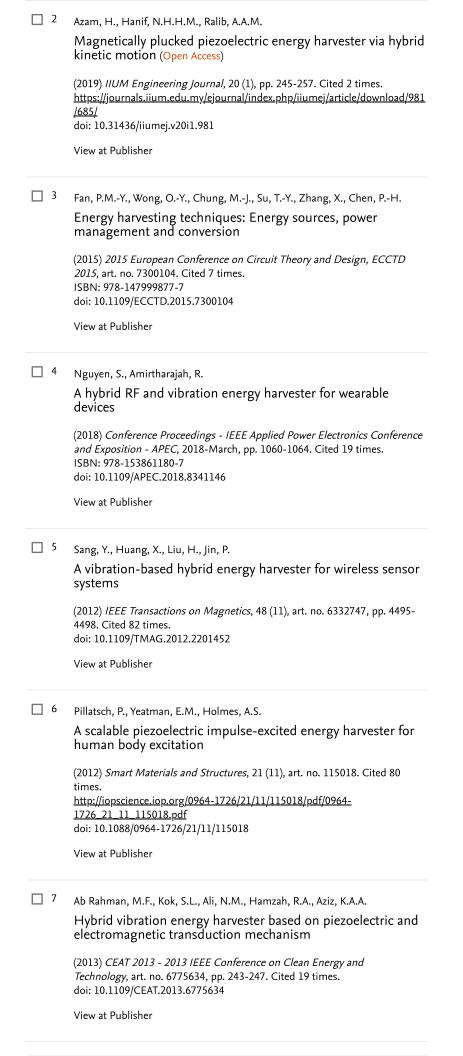
In micro-scale energy harvesting, piezoelectric (PZT) energy harvesters can adequately convert kinetic energy from ambient vibration to electrical energy. However, due to the random motion and frequency of human motion, the piezoelectric beam cannot efficiently harvest energy from ambient sources. This research highlights the ability of piezoelectric energy harvester constructed using a PZT-5H cantilever beam to generate voltage at any input frequency from human motion. An eccentric mass is used to convert the linear motion of human movement to angular motion. Then, using a magnetic plucking technique, the piezoelectric beam is deflected to its maximum possible deflection each time the eccentric mass oscillates past the beam, ensuring the highest stress is induced and hence the highest current is generated. For testing works, the frequency of oscillation of the eccentric mass is controlled using an Arduino Uno microcontroller. In this work, it is found that when given any input frequencies, the energy harvester produced a consistent AC voltage peak around 5.8 Vac. On the other hand, the DC voltage produced varies with respect to the input frequency due to the number of times the peak AC signal is generated. The highest DC voltage produced in this work is 3.7 Vdc, at 5 Hz, which is within the frequency range of human motion. This research demonstrated that energy can still be effectively harvested at any given low-frequency input, in the condition that the piezoelectric beam is being deflected at its maximum © 2022. IIUM Engineering Journal. All Rights Reserved.

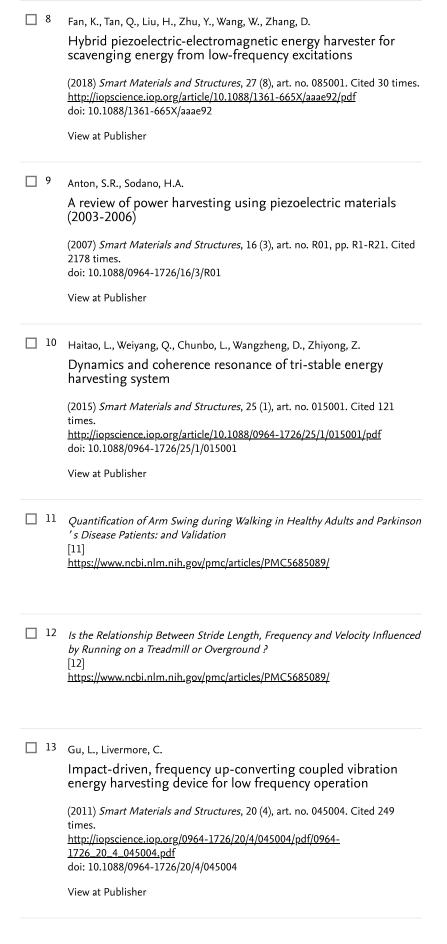
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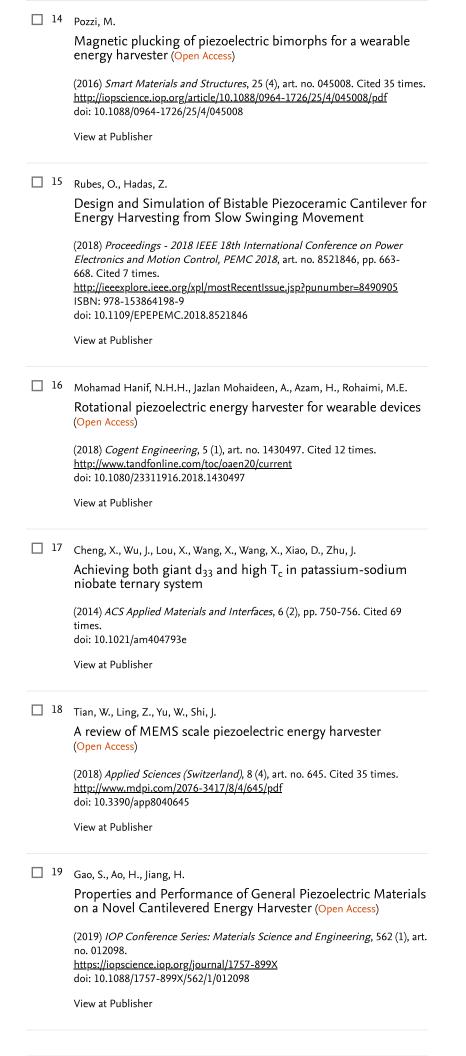


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