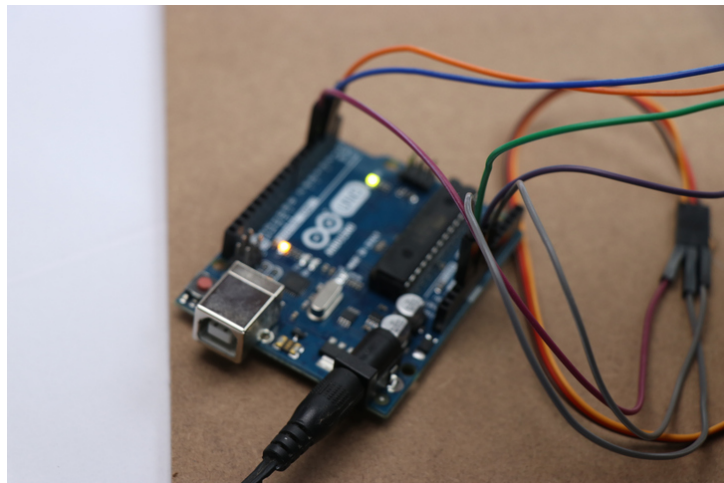




Mechanical Amplifier for Energy Transducer Devices

TECHNOLOGY NUMBER: 5960



Technology ID

5960

Category

Hardware

Engineering & Physical Sciences

Semiconductors, MEMS, and

Electronics

Inventor

Khalil Najafi

Iman Shahosseini

Rebecca L. Peterson

Further information

Joohee Kim

jooheek@umich.edu

View online



OVERVIEW

Energy harvesting and sensing using concentric frame electromagnetic transducer

- Efficiently harnesses ambient vibration energy and monitors system health with multifunctional capabilities
- Car suspensions, helicopter dampers, rail tracks, bridges, electromechanical actuators

BACKGROUND

Traditional mechanical systems for energy harvesting from ambient vibrations faced limitations in converting kinetic energy to electrical energy efficiently. Early approaches involved basic piezoelectric materials and simple electromagnetic systems failing to produce substantial power. Existing technologies often struggled with inefficiencies, limited functionality, and durability under varying environmental dynamics. The need for a multifunctional transducer that simultaneously captures energy and monitors host systems becomes more apparent as modern infrastructures and vehicles demand energy-efficient and self-monitoring technologies. Such a transducer could significantly enhance the usability and maintenance of dynamic systems, reducing dependency on external power sources and improving overall system reliability.

INNOVATION

Researchers at the University of Michigan have developed an electromagnetic transducer comprising two concentric frames, which is uniquely designed to move relative to each other along their central axis. One frame incorporates the magnetic structure of stacked permanent magnets, while the other contains the concentric conductor coil turns. By exploiting the relative movement induced by ambient kinetic energy, the transducer efficiently generates electrical potential or can provide mechanical displacement when used as an actuator. This flexible system can be configured as an energy harvester, a dual-mode energy harvester, and a sensor, or as an electromechanical actuator.

ADDITIONAL INFORMATION

INTELLECTUAL PROPERTY:

[US10985633](#) "Vibrational energy harvester with amplifier having gear assembly"