Energy harvester for human body motions

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INTRODUCTION

Wearable devices such as medical applications, sensors, watches and other gadgets, have a requirement of a power supply. In most cases it is from batteries but they need to be replaced or recharged over time, they take up a lot of space and can be harmful to the environment. The energy harvester for human body motions can harvest the energy for the wearable applications directly where the power is needed and in that way reduce or completely remove the need of batteries.

THEORY

The energy harvester for human body motions is made as a permanent magnet generator with ten permanent magnets rotating on each side of nine copper coils as seen in figure 1. The figure does not show the bearings and the shaft which are also a part of the generator. The momentum comes from two eccentric weights placed on top of the magnets on each side, much like the already existing mechanism in self-winding wrist watches. Instead of tightening a spring for the clockwork, the eccentric weights transfer momentum to the magnets. When the generator is tilted or exposed to human motion forces, the magnets will rotate past the copper coils and induce a small voltage. The voltage will be volatile just as human motions so it will be smoothed by a power converter which will make the voltage steady and supply power to the desired wearable application when needed. The size of the generator is intended to be around 4 cm or less in diameter in order to be used in combination with a wearable application.

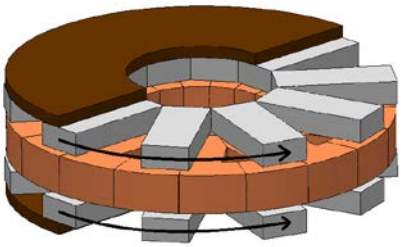

Figure 1 Sketch of the energy harvester

METHODS

Throughout the project equations have been developed and used to design the generator, simulations have been performed in order to validate the design theory and a prototype has been produced as a proof of concept.

Conclusion

An energy harvester for human body motions has been designed, produced and tested. It can reduce or in some cases remove the need of batteries in wearable applications.