Research project and supervisory team

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Short introduction & description of research project	This research proposes a novel footstep antiphase motion vibration energy harvester for wireless sensor nodes. The sensor could be used for data collection, monitoring purposes or safety preventive measure. More specifically, the power is harvested when a human step along a special design path by converting the kinetic energy from the footstep into electrical energy. The harvested power is a green energy which is supplied to the wireless sensor nodes for different purposes. In addition, it will eliminate the use of battery in which the power will be depicted over the time. There are three main research elements to be focused. Firstly, a high efficient footstep antiphase motion energy harvester at a minimum frictional force will be designed. Friction is one of the energy losses, which is the disadvantages for the energy harvester. It is necessary to design the prototype using minimum components. Secondly, a novel antiphase rotation design mechanism will be developed. Under the antiphase rotation mechanism, the relative velocity will be doubled, and hence the power will also be doubled under same volume constraints, especially under a low rotation speed/frequency. An optimum geometrical ratio between the magnets and coil dimension/orientation increased the difficulty of the design. Lastly, the power converter and management system is to convert the harvested energy from AC-DC by increasing the power under specific conditions. Overall, this works will employ the antiphase concept which is proved to be high power. By using this method into the rotation concept, it is expected the power will be doubled, and the power will be continuous supply if the path is being pressed. At the end of the research, a working prototype will be developed, and it is potential to be commercialized in the future.
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