

## Development of a Low-Cost Energy Harvesting Floor Tile that Operates from Footsteps

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### Abstract

This paper presents the designing and fabrication of a low-cost energy harvesting floor tile that harnesses kinetic energy available in human footsteps. The means of harnessing energy is done by use of several mechanisms such as rack and pinion, shafts, two-way to one-way rotational convertor, and an electric motor which is used as a generator to harness the useful energy to be implemented in electrical appliances. This technology can be implemented in office spaces, crowded areas and can also be integrated into Smart City concepts with great occupancy patterns and intensity. Available models in the markets are expensive and are manufactured by foreign companies. As a result, adopting an efficient and low-cost approach would be beneficial to the Sri Lankan context. The theoretical aspects of the project model design, material consideration of components, motor selection, fabrication, and testing of the designed tile are delineated in the paper. The comprehensive material selection technique has enabled the determination of the most suitable material using Multi-Criteria Decision Making and the ELECTRE III method. The calculated cost per watt of the designed model is 22.50 USD per Watt, which is lower than the available models. This technology can be furnished as per requirement considering flooring area, environmental conditions, and implemented in office spaces, crowded areas and be integrated to Smart City concepts.

**Keywords:** *Footstep power generation, Low-cost power generation, Renewable energy, Two way to one way rotational convertor*