

## Design and Development of a Range of Devices Utilising Energy from Human Footfalls



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**Keywords:** Energy Harvest, Footfalls, Piezoelectric, Children Play Equipment

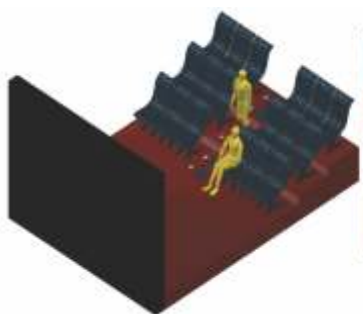
**Abstract:**

The major problem in this world is energy deficiency. Demand for electricity is projected to increase in the future. The growing population could be a considerable resource for an idea to generate electricity by utilizing the rich source of energy from human footfalls. When person walks, he loses energy to the surface in the form of impact and vibration. This energy can be tapped and converted to usable form of electrical energy.

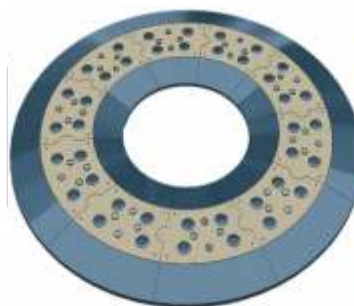
The aim of this project is to create a device that harvests unutilized human footfall energy into usable form of electrical energy. Piezoelectric material is used to convert this ambient footfall energy into electrical energy. The project begins with research study on piezoelectric materials and their applications. Survey was conducted at high density public areas like railway stations, malls and theaters. Design research methods like market study, user study, QFD and PDS were adopted to derive the technical features of the product.

Based on research, three design concepts were generated considering functionality, ergonomics and safety. One concept finalized for detail design and mock-up modelling. Mock up model was created with scale of 1:2 for product validation. And as a proof of concept full scale working prototype was developed.

Final chosen concept is a play equipment with lights designed for children to function without an external power source. The system starts functioning when children step on the tile piezo discs are activated and generate electricity. This is connected to the compact step-up transformers and from there to LED lights. So this makes the children to play around it. The design is circular in order to give continuity using a circular path and provision made for easy assembly and disassembly. Barriers are provided on the side for safety for the children from falling down. The surface texture of the tile chosen is mat finish as this enables a firm grip when children walk or run on it.



**Concepts 1**



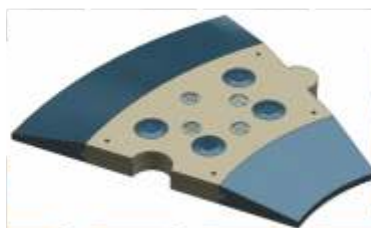
**Final concept**



**Prototype - proof of concept**



**Concepts 2**



**Final concept**



**1:2 Mockup model**