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| **Title:** | Foot Step Power Generation: A Comparative Analysis of Multi-Array Piezoelectric Transducer Configurations | | |
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| **Abstract:** |  |
| Energy generation from green energy sources is gaining popularity day by day. Kinetic energy is produced while humans walk or run or jump and this energy can be converted into watt power with the help of piezoelectric transducers. One  crucial aspect in this process is the configuration of different numbers of circular disc piezo sensors on the small area of the foot sole. This study aims to do a comparative analysis of the connection configuration of various piezoelectric sensors and determine the best output voltage and power achieved from  footsteps. Additionally, the research aims to incorporate IoT to monitor the battery status. Four types of connection configuration of circular disc piezoelectric transducers on sole pads named series, parallel, series-parallel, and parallel-series topology have been designed and tested practically. Piezoelectric sensors of 35mm dimension with a thickness of 3.36 mm are chosen and there  are eight piezo sensors placed on the sole pad in a manner where the exerted pressure is maximum. With a very simple energy harvesting circuit be void of boost converter and voltage regulator the experiment has been conducted. The investigation revealed that a single step on the sole pad, exerting a pressure of 686.7N, can generate a maximum of 25 V in both parallel topology  and parallel-series topology configurations. Conversely, the series topology exhibits the lowest converted voltage in comparison to all other configurations. But in the case of charging the battery  by giving approximately 1000 steps the stable configuration is  reported as parallel topology having the maximum dc current and  power. The findings will help to select the right configuration for  application in low-power-consuming devices like portable health  care electronic devices, batteries, and sensors. | |