

# Smart Energy Harvesting System

## Background of the problem

Generally, we all noticed that in public spaces like schools, malls, and transportation hubs, mechanical energy generated by human movement is often wasted. Harnessing this energy presents an opportunity to create an eco-friendly power source that complements existing energy systems. This approach not only reduces dependency on non-renewable resources but also introduces innovative ways to utilize untapped energy sources. By implementing such systems, public spaces can enhance energy efficiency, lower carbon footprints, and contribute to environmental conservation. Moreover, this technology demonstrates how simple human activities can be leveraged to address broader societal challenges, offering a practical, scalable solution for sustainable development.

**Problem Statement:** Design a system to harvest energy from mechanical vibrations or footsteps in public places (e.g., school corridors or malls). How much energy can be generated if 100 people walk through the area in an hour?

## Solution Idea:

- Use piezoelectric sensors to convert mechanical energy into electrical energy.
- Estimate energy generated using the formula:  $E = P \times n \times t$  where P is the power output of a single piezoelectric sensor, n is the number of steps, and t is the time.
- Students can calculate energy output for a typical scenario (e.g.,  $P = 0.1\text{ W}$ ,  $n = 100$ ,  $t = 3600$  ).