

## **Rotational Piezoelectric Energy Harvesting: a comprehensive review on excitation elements, designs, and performances**

### **ABSTRACT**

Rotational Piezoelectric Energy Harvesting (RPZTEH) is widely used due to mechanical rotational input power availability in industrial and natural environments. This paper reviews the recent studies and research in RPZTEH based on its excitation elements and design and their influence on performance. It presents different groups for comparison according to their mechanical inputs and applications, such as fluid (air or water) movement, human motion, rotational vehicle tires, and other rotational operational principal including gears. The work emphasises the discussion of different types of excitations elements, such as mass weight, magnetic force, gravity force, centrifugal force, gears teeth, and impact force, to show their effect on enhancing output power. It revealed that a small compact design with the use of magnetic, gravity, and centrifugal forces as excitation elements and a fixed piezoelectric to avoid a slip ring had a good influence on output power optimisation. One of the interesting designs that future works should focus on is using gear for frequency up conversion to enhance output power density and keep the design simple and compact.

**Keyword:** Piezoelectric; Rotational energy harvesting; Energy harvester excitation elements; Rotational energy harvester design; Factors affecting energy harvester performance