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Power Generation Using Dynamometer and Flywheel Energy Storage System: A Sustainable Approach to Mechanical-to-Electrical Energy Conversion

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Abstract: *The increasing global energy demand and environmental concerns associated with conventional power generation methods have necessitated the exploration of alternative, sustainable energy solutions. This paper presents a comprehensive study on power generation using a dynamometer and flywheel energy storage system (FESS) for converting mechanical energy into electrical energy. The proposed system utilizes a dynamometer to measure mechanical power input and a flywheel to store kinetic energy, ensuring consistent power output. The flywheel's rotational energy storage capability enables efficient energy capture and conversion, making this method suitable for applications with intermittent mechanical motion such as gym equipment, bicycles, and industrial machinery. Experimental analysis demonstrates the feasibility of generating clean, renewable energy using readily available mechanical components. The system achieved a maximum efficiency of approximately 85% with a cost-effective implementation totaling ₹10,000. Results indicate that this approach offers a viable solution for small-scale power generation applications while contributing to sustainable and eco-friendly power solutions.*

Keywords: Flywheel Energy Storage, Dynamometer, Sustainable Energy, Mechanical-to-Electrical Conversion, Renewable Energy

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