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Harvesting Electrical Energy from a Stationary Bike: An Experimental Approach

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Abstract

In any gym there are people on treadmills, stationary bikes, elliptical or rowing machines producing power in order to burn calories. The power being produced is dissipated primarily as heat. Human energy, if captured and used as an alternative to fossil fuel could supply a gym with clean sustainable energy that would be good for the environment and save the gym money. The process of capturing, converting and storing this energy is known as Energy Harvesting (EH).

This project examines the use of a stationary bike to harvest energy with the use of magnets and an electromagnet. The aim was to create a device that would not require modifications to be made to a standard stationary bike, thus making it affordable and easy to use. A prototype of a stationary bike was designed using SolidWorks and experiments conducted to test the feasibility of this method of EH, results were positive. A typical stationery bike was acquired, experiments were conducted to determine the ideal set up for optimum EH and modifications were made as required. Based on the findings of these experiments the final set-up of the stationary bike incorporated an electromagnet made with high permeability, magnets were attached to a flywheel of a stationary bike with their poles alternating to enhance production of flux, suitable number of magnets were determined and the air gap in the circuit was adjusted to control reluctance. After the set-up was complete the bike was ridden and power output recorded, the findings showed that while energy was harvested the quantity was not significant. Therefore this method of EH is not efficient on a stand-alone machine; however with further research and in conjunction with other forms of EH it could be used. This project was successful in creating a method of EH from a stationary bike using magnets and an electromagnet, without modifying the bike; it is a step in research, in the journey towards capturing and converting wasted energy.

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