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Design of an Electromagnetic Vibration Energy Harvester Using the Vehicle Suspension

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Abstract:
The vibration energy dissipated from the oscillation and damping of the vehicle suspension system is usually wasted. This vibration energy can be converted into voltage output to power up other suitable electrical components in a vehicle. The wasted vibration energy can be harvest by using many types of energy harvester, and the electromagnetic energy harvester is one of the interesting harvesters to explore. The electromagnetic energy harvester is a system that captures the wasted energy from the ambient source and converts them into other usable and useful energy. The main objective of this paper is to design an study of electromagnetic vibration energy harvester using the vehicle suspension. The main idea is to design an electromagnetic energy harvester that can fit the vehicle suspension and harvest the maximum power output through the vibration of the suspension. The components of a basic electromagnetic energy harvester include the coil, magnets, wires, and the mounting case to keep the components together that can be attached to the vehicle suspension. The design is to be studied based on two proposed designs of the electromagnetic vibration energy harvester. Each design has a different mechanism and parameters set up that resulted in varying voltage output values. The electromagnetic energy harvester design was simulated using the input frequency of 50 Hz with magnet permeability, and the voltage output value discussed. The design has the highest collected simulation data of voltage output that can be used as a guideline for future research.