SENIOR DESIGN PROJECT: ENERGY HARVESTING ABSTRACT

Existing suspension systems absorb vertical displacements in a nonconservative manner, often using hydraulic fluid pressure in combination with springs to decrease oscillations and return the vehicle to its previous equilibrium. Instead of dissipating that energy, rerouting it back to any of the increasing number of electrical components within the vehicle system presents an opportunity for increased efficiency. The goal of this project is to design a damping system to convert vibrations into useable energy without sacrificing mechanical efficiency. Three unique methods were researched, and cross examined to determine the best course of action:

- ➢ Converting Linear motion to rotation motion for an alternator;
- ➢ Piezoelectrical Materials integrated with existing suspension; and
- ➢ Permanent Magnets with coil wires acting as a linear generator.

The permanent magnet idea scored highest on the design rubric, which compared design considerations such as manufacturability, cost, estimated system efficiency, and complexity. This idea was also Dr. Ahmad Vaselbehagh's recommendation as the most promising design that could be completed within the period of this project. This project examined the improvement capability of implementing an electrical energy harvesting system in place of the conventional hydraulic damper, which dissipates energy through heat. Through prototype experimentation, a relation between terrain and potential harvestable energy will be produced to evaluate the cost effectiveness of replacing hydraulic suspensions. If the system proves superior, a business plan will be created to take the product to market.

Energy Harvesting Semi-Active Damper Suspension System Team Members:

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