Using Magnets and Electromagnets to Replace Traditional Static Automotive Suspension Systems in Hopes of Decreasing Body Displacement

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Each year, millions of auto accidents occur, many of which are the result of loss of control due to unstable vehicles or worn-out parts (NHTSA, 2019). The suspension system plays a key role in vehicle stability by absorbing shocks from the road and ensuring a smooth ride, however traditional systems can't achieve maximum ride comfort and handling performance. This project explores the potential of replacing traditional suspension components with adaptive technologies like magnets and electromagnets. A model to test this theory was first developed, simplifying the suspension system to a cam and rocker arm type system which was then 3d modeled, printed, and built. Then the cam, or ground simulation, would rotate while the lever would ride against the cam on one end and be connected to the suspension type on the other with an accelerometer mounted on the lever for collecting data. In conclusion the proposed and tested magnet system did not achieve the engineering goal. This is evident in the higher average acceleration indicating that the magnetic system didn't absorb as much energy as the traditional suspension did. In the future something that would benefit the project would be increasing the scale of the wheel, increasing the overall size but also the size of the dips. Thus, allowing for more rotating area as well as a large actuation angle in the shock, covering the full range of motion allowing the analysis of the overall system instead of a focused band of motion.

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