# Hoverboard: A Magnetically Levitated Vehicle

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We have worked in this year’s continuation project on the development of a magnetically levitating vehicle (MLV) that can hover in an actively controlled manner over a diamagnetic aluminum plate. Key achievements are the design and construction of an MLV that is remote-controllable, stable, load-bearing and fully steerable. We managed to model and simulate all the relevant magnetic and electrical effects that occur. Our MLV uses four tiltable rotating discs that are fitted with specially arranged permanent magnets. The arrangement of the magnets leading to levitation was developed in a previous project. In this project we were able to use the magnetic field also for the propulsion and steerability of the MLV. All the functional elements of the MLV were tested individually and then implemented successfully to the final MLV. The tests and experiments were supported by detailed theoretical simulations including a mathematical study on the efficiency of the known Halbach Array compared to new arrays. In addition, we have tested the load capacity of different rotating disks and the ability of the MLV to climb sloped surfaces. By adding a guidance rail, we could minimize the aluminum plate beneath for making it as cheap as possible. This is a research topic that has only been of interest for a few years. We see commercial usability of the magnetic levitation principle e.g. in emission-free and friction-free transport processes.

**Awards Won:**