

Functional Description for Magnetic Levitation Train Technology II

Group Members:

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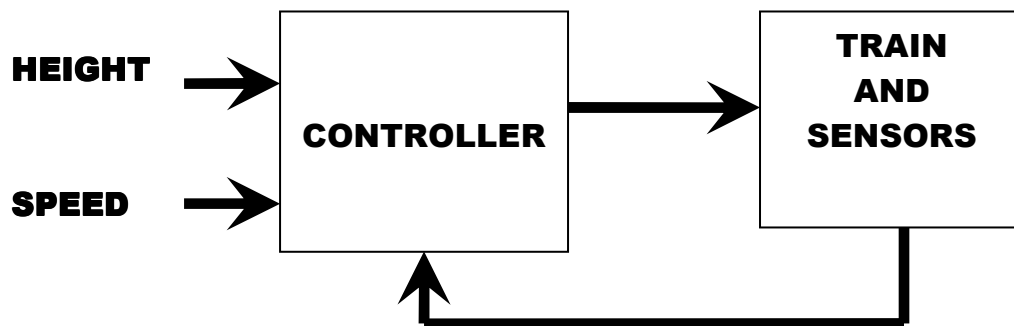
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DESCRIPTION:

This project will consist of levitating a train on a track and propelling it around the track. Control system theory and electromagnetism will be the major concepts used in this project. The speed of the train and height of levitation will have to be controlled. Electromagnets will be used to levitate the train and propel it down the track.



DIFFERENT TECHNOLOGIES:

Levitation:

- *Electromagnetic suspension (EMS)*
Ferromagnetic guideways attract the electromagnets on the train
- *Electrodynamic suspension (EDS)*
The magnets on the train produce currents while traveling in the guideway. This uses repulsion to guide and support the train, but will need a support for “landing” and “takeoff” since EDS does not work below 25 mph

Propulsion:

- *"Short-stator" propulsion*
A linear induction motor winding on the train, and a passive guideway (aluminum plate installed along the rail surface) is used to propel the train.
- *"Long-stator" propulsion*
An electrically powered linear motor winding in the guideway instead of a passive system like the short-stator
- *Linear electric motors*
A power source that provides electric traction in a straight line, rather than rotary, as in a conventional motor.

DESIRED INPUTS:

- Suspension Level of the train – This will determine if the train should be levitating or not
- Speed of the Train – This will determine how fast the train will be moving

SUBSYSTEMS:

- Train – Electrical Components on it will be determined later
- Track – Type of Track will be determined later
- Sensors – At least 3 sensors will be used: Speed, Height, Lateral

POWER REQUIREMENTS:

For this project, we will be limited to the power supplies made available to us in the lab. The project current draw could be substantial. Many high power electronics devices, such as switching transistor will be needed. More information on power electronics will be given when more information about the track and train has been determined. Even with all this power, the power used to propel and levitate the train should be less than to air condition it.

REFERENCES:

<http://www.dom.com/about/companies/vapower/maglev/index.jsp>

<http://www.lanl.gov/superconductivity/train.shtml>

<http://www.howstuffworks.com/maglev-train.htm>