Using Magnets for Transportation

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Abstract: Transportation is a big issue amongst our society today. Driving cars seems convenient, but is bad for the ecosystem. Riding a bike is good for the ecosystem, but can sometimes be inconvenient. The perfect solution? ...Hoverboards. Yes, it may seem impossible. We’ve only ever seen them in movies after all. It may not be so impossible. By using repelling magnets, we may see hoverboards sometime soon.

Introduction: Isaac Newton’s third law states that all actions have an equal and opposite reaction. This means that when one force pushes in one direction there will be a force pushing in the opposite. It is the same with repelling magnets. The magnets push in opposite directions to make the magnets repel. If we can find a way to get lightweight magnets that are strong enough to repel off of the ground, then hoverboards will be possible.

What are magnets? A magnet is an object or a device that gives off an external magnetic field. Permanent magnets create a field all the time. Temporary magnets create a magnetic field only when in the presence of another magnetic field. Electromagnets only create a magnetic field when electricity is running through them. Magnetism is caused by many atoms spinning in the same direction. All magnets possess a property called polarity. This means that a magnet’s power of attraction is strongest at its opposite ends. This also means that they repel when similar poles are put together.

Why do magnets repel? Every magnet has a north and south pole. When you place two similar poles together (n,n & s,s) they will move away from each other. This is called repelling. Magnets repel because they are constantly looking for an opposite pole. When they are close to another similar pole they try to push through the magnet to get to the opposite pole. This causes them to push apart.
Maglev, trains, and hoverboards: There is a type of transport method called Maglev. This stands for magnetic levitation. It is a way of moving vehicles without having them touch the ground. Maglev is typically used in trains. With maglev vehicles travel along a magnet guideway. The train has magnets on the bottom. The repelling magnets create lift and propulsion, reducing the amount of friction. This means that the train can travel at very high speeds.

How would this tie into hoverboards? Think of an ice rink, but instead of ice you have a large strong electromagnet that pulses. The magnet’s north pole was facing upwards. The board would also have a strong magnet on the bottom. The magnets would repel, creating a Maglev effect. Now you have a hoverboard. When the rink pulses the board will move forward. When the magnet you are above turns off you will move to the closest magnet. If the closest magnet is in front of you, you will go forward. If the closest magnet is behind you, you will go backwards. If hoverboards become a trend the roads might become hoverboard friendly. Strong electromagnets would be placed under the asphalt to create the same effect as the magnetic rink.
To demonstrate how the hoverboard would work I performed an experiment that demonstrates magnetism and repelling magnets.

**Procedures**

**Setup:** Get a styrofoam cube and push a thin wooden dowel into the center. Gather two or more iron magnets with holes in the middle.

1) Find the poles on each magnet
2) Slide the dowel through the hole in your first magnet.
3) Continue layering the magnets so they are repelling against each other (North Pole up, South Pole up, North Pole up, South Pole up.)
**Result:** You should see each magnet float off the one above it. This happens because the repelling forces push off of each other.

**Conclusion:** Using magnets as transportation solves many problems. It would cut down on the air pollution, while being an easy and effective way for getting around. If we could scale down the concept of maglev trains into small boards, everyone would have an easy way to get around.

**References**


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**About the Author:** Jaya is a seventh-grade student at Isaac Litton Middle Prep.