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Review on Electromagnetic Hover Board

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ABSTRACT

People are more attracted towards smart technology and fantasy. Here fantasy things are practically made true with the help of science and smart technology .Hover board is similar to skate board but deviation is, it rely on super-strong magnets and electromagnetic levitation to stay aloft . The term ***levitation*** *refers to a class of technology that uses electromagnetic levitation to propel vehicles with electromagnets rather than with wheels axels and bearings. Hover board can be considered as solution for future needs of the world. There are three types of hover board which we are discussed in this paper based on improvements and compatibility.This paper gives an idea about self levitating boards and how they actually works.*

KEYWORDS: *Hover board , Levitation, Propel.*

I. INTRODUCTION

Across the world, Engineering has the common Moto is -"Improving the Quality of Life" of mankind without any restrictions. To achieve this transformation in science and technology is needed. The term levitation refers to a class of technology that uses electromagnetic levitation to propel vehicles with electromagnets rather than with wheels axels and bearings. Hover board is a personal transportation device which lifts person, where person can experiences more smoothness while moving. . Hover boards[1] are generally depicted as resembling a skateboard , initially boards were based on wheels but after modifications and applying electromagnetic concepts boards are made without wheels. First type of hover board is similar to helicopter which weights a single person. Next board is based on concept of magnetic levitation .Last one is based on superconduction. Hover board contains electromagnets so that conductivity is made possible due to repulsion it floats and moves forward . Basic concept can be applied for further future transportations also to reduce real time problems such as vehicle traffic etc. Major applications fall in the fields of medical and self transportation. Now a days jet[2] based hover board is invented which is having amazing speed .These concepts of hover boards will help in future to make amazing transportation.

II. LITERATURE SURVEY

In 2006 Chinese developers unveiled the world's first full-permanent magnetic levitation (Maglev)" wind power generator at the Wind Power"[1] Asia Exhibition 2006 held June 28 in Beijing, according to Xinhua News. September 22, an elevated Transrapid train collided with a maintenance vehicle on a test run in Lathen (Lower Saxony / north-western Germany). Twenty-three people were killed and ten were injured. Back in the 1950s, an aircraft manufacturing company, Hiller aircraft, produced the "Flying Platform"[2] which had many similarities to the modern concept of a hover board. Information that got in circulation in 2001 confirmed that Ginger, an invention by Dean Kamen of Hiller Aircraft, was a real Segway human transporter; hence, this invention was a self-balancing two-wheeled electric transportation device.[3]In 2004, an attempt by Jamie Hyneman and his team to built a makeshift hovercraft was successful. The attempt led to invention and production Hyneman Hoverboard. This hover board was made from a surfboard and leaf blower. However, despite the success, Jamie's hover board was not very effective.[4]In 2005, a hover board was made by Jason Bradbury for The Gadget Show. He

did his production using a wooden board that was levitated using a leaf blower. The initial design was not propelled and could not be steered too.In 2009, the second version by Jason was made which. This was an improvement of the first one as it was propelled/steered by a small jet engine and also contained two more powerful leaf blowers.

In October 2011, The University Paris Diderot in France was observed. The University presented the "Mag Surf", a superconducting device that can levitate 3 cm above two magnetized repulsing floor rails. As compared to Nil Guadagnin's earlier production, this was an improvement since the board could carry up to 100 kg. [5]In May 2015**,** announced that the Romania-born Canadian inventor Catalin Alexandru Duru He continuously travelled as a controlling pilot on an autonomously powered hover board, travelling over a distance of 200

III. Working Principle

There are mainly three types of hover boards based on concept of working.And working and principle is given.

A. Omni Hoverboard:

All hoverboards, need some upward force to push against the gravitational force. For the Omni hoverboard, this upward force is from the air. The props push air downward resulting in an upward force on the rotors. Just like a helicopter, it can move both up and down as well as side to side. This Omni hoverboard[3] can fly over water or land. It doesn't really matter what is below it. The Omni hoverboard has two major flaws. First is the flight time. Since this is essentially like an electric powered quadcopter[4], it needs a battery. Batteries are heavy, fig 1.so it can only power the propellers for a couple of minutes of flight time. Second, is the risk of human life due to instability in it.

Fig 1.

B. Hendo Hoverboard:

Working principle is based on farads laws.A changing magnetic field induces a current in a wire that is conducting. This principle is applicable for most of the electric generators. The magnitude of the induced electric current depends on the intensity of changing magnetic fields. If the magnet is moved faster , more current is generated . If the magnet is kept stationary ,the magnetic field doesn't change at all resulting into zero current.But if there is an electric current in loop of wire, that induced current also makes a magnetic field. It turns out that this induced current makes a magnetic field that is in the opposite direction as the change in magnetic field due to the magnet.

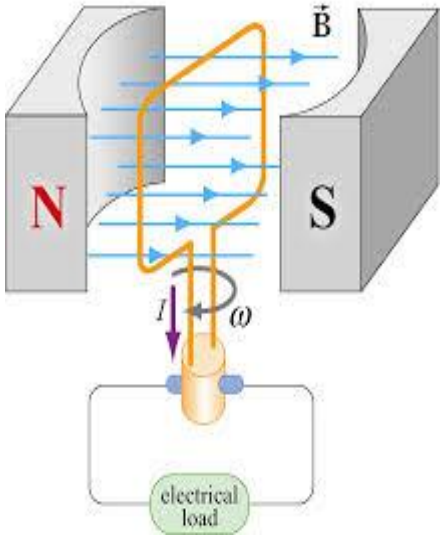

Fig 2.

If the magnet was moving to the right, the magnetic field due to the magnet (which I labelled *B*m) would still be pointing to left, but it would be decreasing in magnitude at the location of the coil. This means that the induced current (and thus the magnetic field due to the loop) would be in the opposite direction as shown in the Fig 2.

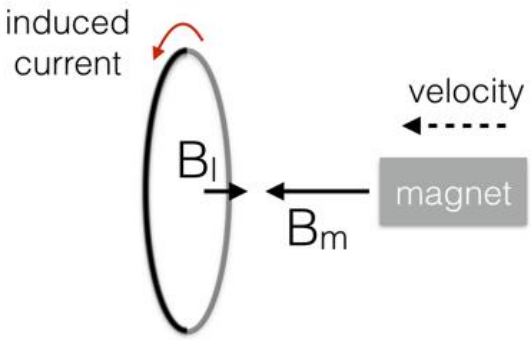

Fig 3.

Now instead of using the magnets we can also make use of Electromagnets. That is, If we replace

the magnets in the diagram with a coil of wire, we can change the magnetic field without even moving coil. Just by changing the current in the one coil, we can induce a current in the other coil. We can continually change the magnetic field in the electromagnet by just having the current oscillate back and forth. So here in the Hoverboard we are making use of Electromagnetic levitation.The Hendo engine uses electromagnets that produce changing magnetic fields to interact with a conducting surface.Fig 4 basically when these electromagnets change the magnetic field that produces an electric current in the metallic surface underneath the hoverboard. This electric current then produces its own magnetic field to repel the hoverboard electromagnets. It's clearly a skateboard that hovers. Major flaws are The primary problem with this hoverboard is that it only hovers over a conducting surface. If you put this over water, the electromagnets would still make changing magnetic fields but without an electric conductor below it there would be no repulsion. The other small problem is that it doesn't ride like a skateboard.

Fig 4.

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C. Lexus Hoverboard:

This hoverboard uses magnetic fields. Instead of changing magnetic fields from an electromagnet, the Lexus hoverboard uses superconductors. When a superconductor is placed near a magnet, you can get a levitation effect[5]. The magnets are in the ground and the superconductor is inside the board. It is awesome because this board is much smaller than either the Hendo or the Omni hoverboard.

Just like the Hendo, this board also requires a special surface to ride it on.But it doesn't work over water or any other surface that doesn't already have magnets embedded in the ground. Another drawback is the superconducting magnets. Superconductors need to be very cold in order to have the levitating properties fig 5.. This means that you need to add something like liquid nitrogen (-320°F or 77K) to keep them cold.

Fig 5.

The Slide hoverboard contains a series of metal alloy superconducting blocks cooled to -197°C by reservoirs of liquid nitrogen. The track below contains three magnets that induce a current in the blocks, causing the Meissner effect to take hold and expel the magnetic field back towards the track in a mirror image. These mirroring magnetic forces repel each other and so the board is lifted above the track. Even if someone stands on the board, the magnetic forces are strong enough to keep it levitating because the lack of electrical resistance in the superconductor means the magnetic field can adjust to deal with external pressure.

IV. Conclusion and Future Scope

Electro magnetic levitation is highly advanced and efficient technology which plays key role in hover boards, where many countries are doing research on these boards. Hover boards are conveniently considered as a solution for future needs of the world such as transportation etc. We were able to successfully explained with a model of hover board which works on electromagnetic levitation to achieve frictionless movements. Using aurdino controller experiments are going on which give more reliablility.

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