

# A Shoe Which Makes Us Fly - Flying Shoe

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**Abstract:** It will be really amazing if we wear a shoe which can make us fly and get us to a destination on which we need to land. The concept of such a shoe, so called “the flying shoe” is surely possible with the amazing technology of magnetic levitation. Magnetic levitation is a technology which works well for the linear motion of an object with the help of electromagnets. This project deals with the shoes which have diamagnetic material attached to their base and flying over a track made up of superconducting material. When the superconducting material is cooled to a certain temperature it acquires the superconducting property due to which it levitates the diamagnetic material above it. The track is also aligned with continuous line of opposite poles of the magnet one after the other. Due to successive attraction and repulsion the shoes start moving along the track which leads to linear motion.

**Keywords:** Magnetic levitation, flying shoe, diamagnetic material, superconducting coil.

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## 1. INTRODUCTION

Maglev systems are rapidly developing and becoming popular around the world. Some forces in this world are invisible to the naked eye, but we have solid principle of its work. Magnetism also follows the same. It has been a part of the earth from the beginning whether people realize it or not. Due to the magnetism of the earth, the world spins and thus creates things like gravity. Not only magnetism provides us amazing displays, but also provides us amazing applications. One of the applications is magnetic levitation and it uses the concept of a magnet that the like poles repel each other. The idea described below is given with an eye on the future. All the ideas were inspired from the maglev train and the use of its magnetic levitation principle.

## 2. DESCRIPTION OF IDEA

The basic idea behind this is “The magnetic levitation”. Magnetic levitation is a method by which an object is suspended with no support other than magnetic fields. Magnetic force is used to counteract the effects of the gravitational and any other accelerations. This idea is applied in this paper to make look better and to make things work better. Magnetic levitation is obtained by almost ten methods which could be used appropriately. The different methods of producing levitations are briefed as follows.

1. Repulsion between like poles of permanent magnets or electromagnets.
2. Repulsion between a magnet and a metallic conductor induced by relative motion.
3. Repulsion between a metallic conductor and an AC electromagnet.
4. Repulsion between a magnetic field and a diamagnetic substance.
5. Repulsion between a magnet and a superconductor.
6. Attraction between unlike poles of permanent magnets or electromagnets.
7. Attraction between the open core of an electromagnetic solenoid and a piece of iron or a magnet.
8. Attraction between a permanent magnet or electromagnet and a piece of iron.
9. Attraction between an electromagnet and a piece of iron or a magnet

10. Repulsion between an electromagnet and a magnet

### 3. PARTS NEEDED FOR COSTRUCTION

The following are the parts of flying shoe.

#### 3.1. Diamagnet:

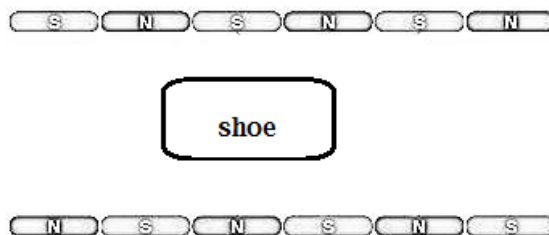
Diamagnetic materials create a magnetic field in opposition to an externally applied magnetic field. It is a quantum mechanical effect that occurs in all materials where it is the only contribution to the magnetism the material is called a diamagnet. In most materials diamagnetism is a weak effect, but a superconductor repels the magnetic field entirely, apart from a thin layer at the surface.

#### 3.2. Superconducting coil:

Superconducting coil acts as passage for current. When the current is passed to the coil, it moves through the windings in the coil. It is used to magnetise the electromagnet.

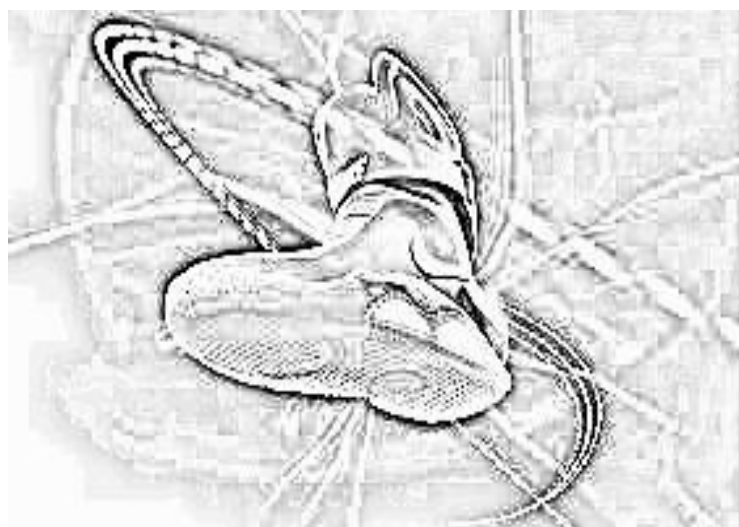
#### 3.3. TRACK:

The track consists of electromagnets and superconducting coil. When the current is passed through the superconducting coil, it magnetises the electromagnet. Magnetic field produced in the electromagnet causes the shoe to levitate above the track.



#### 3.4. SHOE:

The base of the shoe consists of diamagnetic material for levitation. The shoe levitates due to the magnetic field produced in the track. If the shoe needs to be stopped more quickly, the same magnets that pull it forward can be set to push it back. When they do, instead of requiring electrical energy input, they generate electrical energy output, which can be stored in batteries for later use.



#### 3.5. HANGING HANDLE AND HANDRAIL:

Hanging handle and handrail is mainly used as precaution for travellers. Hanging handle is mainly used for supportiveness, grip and ON/OFF mechanism. It is freely movable along with travellers. Handrail provide support at sides.

### 3.6. ON AND OFF MECHANISM:

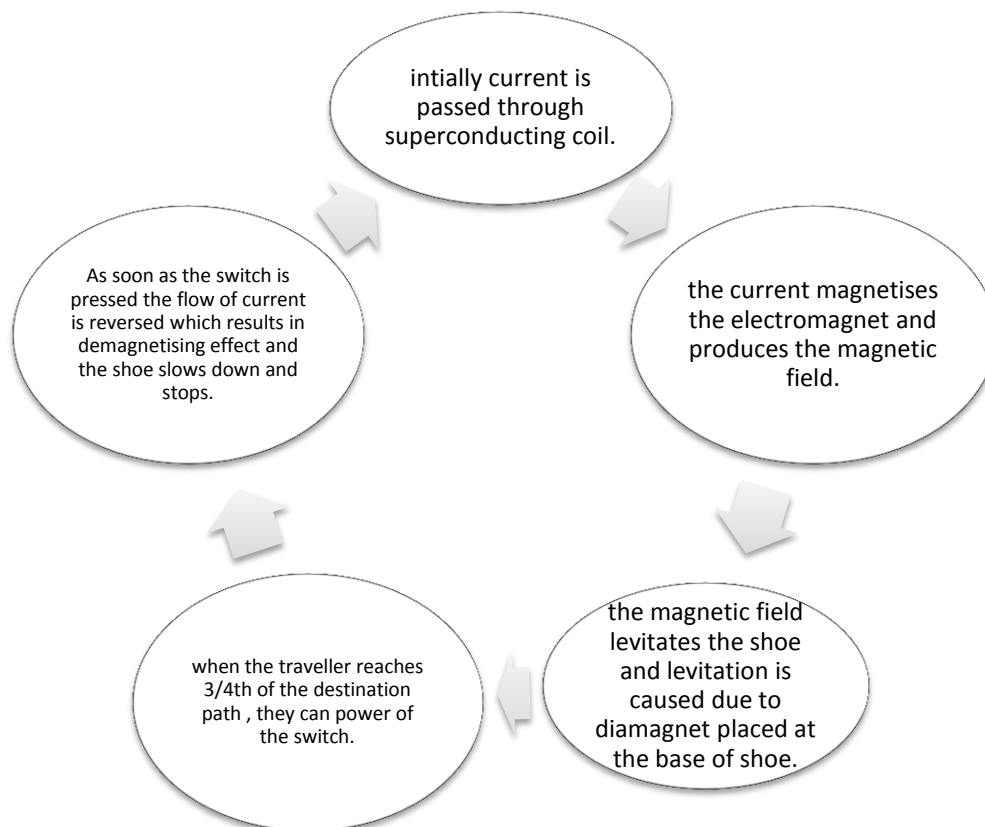
Power switch is mounted in hanging handle. It is user friendly. The power control is at the hands of traveller. Indication will be kept at the 3/4<sup>th</sup> of their destination path so that they can use the power button to terminate the movement of the shoes.

## 4. WORKING

When the current is passed through the coil, the electromagnet gets magnetised and it causes the shoe to levitate above the track, since the base of the shoe consists of diamagnet.

The shoe will be floating about 10mm above the magnetic guiding track. The shoe will be propelled to move by the guide way itself. The shoe is propelled by the changing in magnetic fields. As soon as the shoe starts to move, the magnetic field changes sections by switching method and thus the shoe is again pulled forward. The whole guide way is run by electromagnets so as to provide the magnetic effect. Thus the power needed for the whole process is less. Amongst the power used, only a little is used for the levitation process. But a higher percentage of power is needed to overcome air friction.

When traveller reaches 3/4<sup>th</sup> of the destination path, they can power OFF the switch at the hanging handle. As soon as the switch is pressed the flow of current is reversed which results in demagnetising effect and the shoe slows down and stops.



### ADVANTAGES:

- The dream of people to fly comes true with the help of FLYING SHOE.
- Frictionless movement of the shoes
- They generate electrical energy output, which can be stored in batteries for later use.
- The total mechanism is under the control of traveller and hence accidents can be avoided.
- Fuel usage is totally avoided.

#### **DISADVANTAGES:**

- The construction is costly.

### **5. CONCLUSION**

The forces one cannot see require little faith to understand like magnetic levitation. Magnetic levitation is a technology that is still being newly developed. There is no telling what the future holds for these types of applications. Our planet can be a crowded, polluted, crazy place. But a new design concept proposes that we rise above it all, literally, by moving to a magnetically levitated island in the sky, complete with green forests, mountain, and urban centres. The technology of magnetic levitation is going to make a rapid revolution in the field of engineering in the upcoming years. There are a numerous number of advantages on using magnetic levitation. The main objective of using this technology is to cut down the power consumption to almost negligible value and this is surely possible as there is no frictional power loss. After twenty years we wish to see the whole world making use of the amazing technology of maglev. Although with careful education and research this clean and friendly way of producing force could prove to be a valuable asset to many developing technologies.

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