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## Futuristic Maglev Traction System Using Solar

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### ABSTRACT

This paper involves the idea of a new type of magnetic levitation system using solar technology and electrical power generation using foot step for platform application, which is the best form to use in the present situation. Revolt changes have taken place in the life of human being since he has succeeded to achieve his needs to be done faster through maglev. Electrical energy plays an important role for the maglev. For that the solar energy is use for the electricity generation for the modern train i.e. to work efficient and effective the electrical consumption of maglev train can be decreased. Energy is needed at an increasing rate the existence and well-being of man ever since he came on the earth. Due to lot of this energy resource have been exhausted and wasted. Proposed solution for the utilization of waste energy with foot power human locomotion is very much pertinent and is important for populated countries like INDIA and CHINA. With the use of piezoelectric sensor, we can generate the voltage using foot step force. By using such principle, the energy can be utilized in the whole area where the mechanical energy is being converted into electrical energy.

**Keywords :** Levitation, Revolt, Maglev, Proposed Solution, Pertinent, Piezo-Electric Sensor.

### I. INTRODUCTION

Maglev uses, axels and bearings. In maglev system, a vehicle is levitated away from a guideway using magnets by the short distance (air gap) to lift and thrust. High speed maglev trains promise dramatic improvements for human travels it wide spread adoption occurs. It used as a highly advanced and efficient technology in various industrial applications. The maglev magnetic levitation to propel vehicles with magnets instead of wheels train model gives suitability for the operator so that mobilization can be achieved in simpler way and which consumes less time. Accordingly, demands for innovation means of public transportation have increased. Thus, in order to appropriately serve the new generation transportation system to the public the system must

meet certain requirements such as rapidity, reliability, and safety. Hence for working of train it requires some energy in the form of electrical finally to convert into mechanical support (for the propulsion). Which can be done using solar which is the best form (converts energy into electrical energy) by using solar panels and which then used for the needs to run faster through Maglev. Thus, maglev is proving to be cheaper, safer and quieter with less environmental impact than conventional rail. Given the superior economics, maglev could be put in place years ahead of conventional rail. Also, we have investigated to generated energy for platform with the help of foot step using piezoelectric effect by non-conventional means simply walking or running on the foot step.

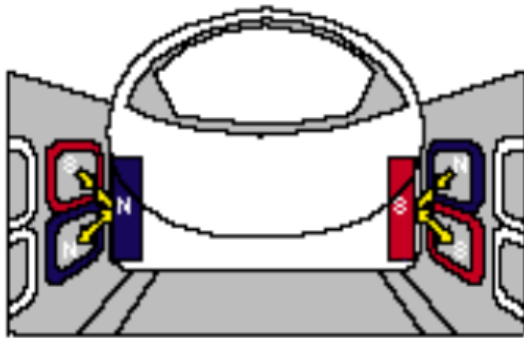
## II. BASIC CONCEPT

Magnets repel each other when they're placed with their like poles together because they create a magnetic field when they're created. While scientists don't rightly know why electromagnetic fields take the shape that they do, their general consensus states that the field leaves one pole and tries to reach the nearest opposite pole that it can, and when you place the like poles together the opposing fields repel one another.

## III. DESCRIPTION

### A. Principle of Magnetic levitation

Maglev is magnetic levitation in which the train float on a guideway using principle the of magnetic repulsion. The repulsive force of magnets is used in maglev trains. Thus, instead of using permanent magnets the principle of electromagnets is used to create strong and large temporary magnets. This electromagnetic forces between superconducting magnets which are present on guideway and bottom of the train.



### B. Propulsion

Propulsion is done by superconducting magnets by repulsive and attractive force induced between superconducting magnets. This propulsion magnets are located on the track which are energize by three

phases alternating current. This coil is present on guideway.

### C. Vehicle

Vehicle is the most important for high-speed maglev system. It consists of levitation of chassis by using magnets mounted on the chassis, secondary suspension system and vehicle section. Besides it includes such an electrical appliance which is used for on board batteries, emergency braking system and levitation control system.

### D. Guidance

Guideways guides and supports the maglev. It also directs them movement of vehicle. Maglev is a floating vehicle above the guideway which is supported by either electromagnetically traction or repulsion forces. These forces are also known as guidance force. The maglev that levitate by magnetic repulsion the train lies above the guideway. Now the similar poles from top and bottom of maglev repel and this pushes the train upward into overring position. Similarly, maglev levitate by magnetic attraction the bottom of train wraps around the guideway levitation magnet which are on the underside of guideway are placed so that it attracts the opposite poles of magnets on that wrapped part of maglev. It raises the train just few centimeters over the ground into floating position. Now by this induced electromagnetic forces from both sides' cancels out each other. Thus, the train runs in center of guideway.

### E. Stability

The combination of static magnets cannot be in a stable equilibrium. Therefore, it requires the dynamic magnetic field to achieve stabilization. Electromagnetic systems based on active electronic stabilization which is use for constantly measures the bearing distance which is adjust the electromagnetic

current, and gives passive stability. Magnetic technology is used to fly, stabilization of pitch, Roll and yaw the maglev vehicle. In addition to rotation, move forward and backward, sway (sideway motion) or heave (up and down motions) can be problematic with other technologies.

#### F. Flexibility and reliability

Air crafts are flexible but commercial air routes are not. High-speed maglevs are designed to compete on journey times with flights of 800kilometres (500miles) or less. Additionally, when maglev serve several cities in between such routes and be on time in all weather conditions, airlines cannot come close to such reliability or performance. Because maglev vehicles are powered by electricity and do not carry fuel, maglev fares are less susceptible to heavy price sales created by oil markets. Maglevs are safe to travel as compare to air travel since maglevs are designed to not to crash into other maglevs or leave their guideway.

### IV. MAGLEV TECHNOLOGY

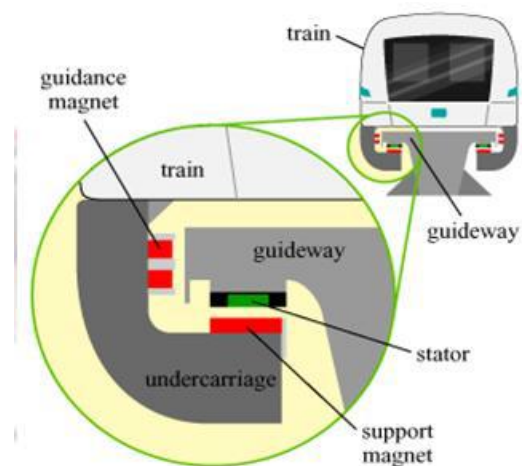
There are two notable types of maglev technology:

- 1) Electromagnetic suspension (EMS), uses electromagnets which attracts the magnetically conductive (usually steel) track.
- 2) Electromagnets suspension (EDS), uses electromagnets on both track and train to push the train away from the rail.

#### A. Electromagnetic suspension

In EMS system, the train is levitated above track while electromagnets are attached to the train, and oriented towards the rail. The system is typically arranged on C-shaped guideway, with the upper portion attached to the vehicle, and lower inside

edges containing the magnets. The train levitate between the upper and lower edges.

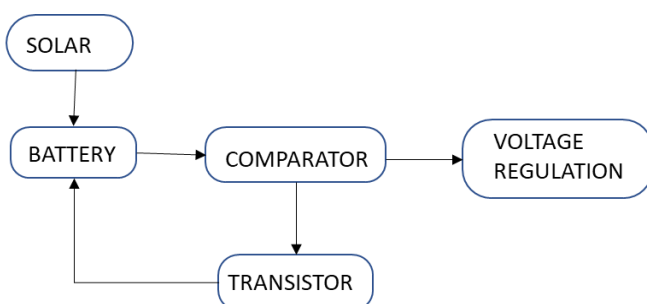


#### B. Electrodynamic suspension

In electromagnetic suspension (EDS) the train is levitated by the repulsive forces between magnetic field which is produced by the magnets, present on guideway and bottom of the train. The magnetic field is generated by permeant magnet and electromagnets. The advantage of EDS and repulsive magnetic field is that they are naturally stable, it also narrows the distance between track and magnets and creates strong force to repel the magnets back to their original position, due to the slight increase in distance, the force reduced and again returns vehicle to the right separation. In EDS system the feedback control is not needed. The advantage of EDS system over EMS system is that it can provide levitation as well as propulsion using an on-board linear motor, while EMS system can only levitate the train and not propel it forward. As the vehicle like maglev needs other technologies for propulsion. A linear motor can be Mounted in the track as a solution. For the long distances where cost of propulsion coils could be restricted, a jet engine or a propeller can be used instead of coil.

### V. WORKING

The working shown below is the general block diagram representation of maglev-based rail system. Input power transfer is not convenient through mechanical contacts. Therefore, in maglev system ground supply by energizing magnets (supplies the on-board system) through magnetic coupling between track coils and train. Operation is based on the concept of capturing the unused energy surrounding any system and which then converts into electrical energy that can be used to extend life of system by suitably providing energy through solar radiation. Here we are using 12V battery. The solar energy is converted into electrical energy using solar panels. This energy is stored in the battery during and after charging from solar panel. For the indication of battery IN4007 diode is used as protection diode to reverse the current from battery to solar panel using LM358. Inside LM358 there are two comparators for detection of either positive or negative going input voltage depending upon the type of input voltage of the operation amplifier. Whenever battery voltage goes below its maximum voltage solar panel will charge the battery. When the battery gets fully charge transistor comparator will disconnect, the contacts of battery from solar panel. Voltage regulator LM317 supports output voltage levels to give a constant voltage supply. And Piezo electric sensor is use to generate energy by using foot step energy which is then converted into electrical energy, this energy is use to charge the battery.



## VI. CONCLUSION

The features implemented in this project such as generating electricity using solar energy can be used for lighting system of maglev train and battery backup. The maglev train using solar technology is in the development stage with the help of solar energy, lighting and fan system can be successfully automated. In low to medium speed maglev train, the operating routine is shorter than the high-speed train. However, in high speed operation EDS technology is preferred for controllability and reliability. In addition, as along with the development of the high temperature supercapacitor new type of neodymium magnets, stronger magnetic energy that is more cost effective will be used for the maglev train. Also, we are generating electricity through foot step energy using piezo sensor.

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