

Implementation of Maglev Turbine and Solar Power for Streetlights and CCTV

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ABSTRACT

Magnetic levitation, maglev, or magnetic suspension is a method by which an object is suspended with no support other than magnetic fields. Magnetic pressure is used to counteract the effects of the gravitational and any other accelerations. The principal advantage of a maglev windmill from a conventional is, as the rotor is floating in the air due to levitation, mechanical friction is totally eliminated. That makes the rotation possible in very low wind speeds. Maglev wind turbines have several advantages over conventional wind turbines. For instance, they're able to use winds with starting speeds as low as 3 meters per second (m/s). Also, they could operate in winds exceeding 40 m/s. Currently the largest wind turbines in the world produce only five MW of power while, one large maglev wind turbine could generate one GW of power.

Keywords: Levitation, Power generation, Magnets, Renewable energy.

1. INTRODUCTION:

Renewable energy is generally electricity supplied from sources, such as wind power, solar power, geothermal energy, hydropower and various forms of biomass. These sources have been coined renewable due to their continuous replenishment and availability for use over and over again. The popularity of renewable energy has experienced a significant upsurge in recent times due to the exhaustion of conventional power generation methods and increasing realization of its adverse effects on the environment. Wind is a form of solar energy. It is a natural power source that can be economically used to generate electricity. The way in which wind is created is from the atmosphere of the sun causing areas of uneven heating. In conjunction with the uneven heating of the sun, rotation of the earth and the rockiness of the earth's surface winds are formed.

The term wind energy or wind power describes the process by which the wind is used to generate mechanical power or electricity. Wind turbines convert the kinetic energy in the wind into mechanical power. This mechanical power can be used for specific tasks (such as grinding grain or pumping water) or a generator can convert this mechanical power into electricity. The wind turbine is used for conversion of kinetic energy of wind into electrical energy. The wind turns the blades, which spin a shaft, which connects to a generator and makes electricity. The Maglev wind turbine design is a vast departure from conventional propeller designs. Its main advantages are that it uses frictionless bearings and a magnetic levitation design and it does not need vast spaces as required by the conventional wind turbines. It also requires little if any maintenance. The unique operating principle behind this design is through magnetic levitation. Magnetic levitation is supposedly an extremely efficient system for wind energy. The vertically oriented blades of the wind turbine are suspended in the air replacing any need for ball bearings. Maglev Wind turbine has the features of no mechanical contact, no friction etc. minimizing the damping in the magnetic levitation wind turbine, which enables the wind turbine start up with low speed wind and work with breeze. Maglev wind turbines have several advantages over conventional wind turbines. For instance, they're able to use winds with starting speeds as low as 1.5 meters per second (m/s). Also, they could operate in winds exceeding 40 m/s.

2. MAGNETIC LEVITATION

Also known as maglev, this phenomenon operates on the repulsion characteristics of permanent magnets. This technology has been predominantly utilized in the rail industry in the Far East to provide very fast and reliable transportation on maglev trains and with ongoing research its popularity is increasingly attaining new heights. Using a pair of permanent magnets like neodymium

magnets and substantial support magnetic levitation can easily be experienced. By placing these two magnets on top of each other with like polarities facing each other.

The magnetic repulsion will be strong enough to keep both magnets at a distance away from each other. The force created as a result of this repulsion can be used for suspension purposes and is strong enough to balance the weight of an object depending on the threshold of the magnets. In this project, we expect to implement this technology form the purpose of achieving vertical orientation with our rotors as well as the axial flux generator.

3. DESIGN OBJECTIVE OF PROJECT

- 1) Incorporation of more renewable energy to the power system.
- 2) Design of a new method of generation of electricity using the wind energy generated by the moving vehicles on the highways , roads, OR home terrace or balcony or school colleges terrace .
- 3) To reduce energy loss due to friction in bearing
- 4) Design and development of magnetic levitated wind turbine.
- 5) Development Stand-alone system for providing the power to the highways. Or streetlamps, singles,cctv...etc..
- 6) Combination of the two natural powers wind and solar to make desired output.
- 7) Main constrain a Low cost device middle class or small scale industries or society can purchase.



CAD MODEL

3.1 Levitating Magnet Turbine

Unlike the maglev vehicle, the vertically oriented blades of the wind turbine are suspended in the air above the base of the machine by using permanent magnet which produces magnetic force to lift up the blades. This system does not require the electricity to operate because no electromagnets are involved. Since the turbine blades are suspended by magnetic force produce by the permanent magnet, there is no need of ball bearing to retain the blades.



Turbine

3.2 Output Producing Circuit

It consists of coils which are placed in series and parallel combination, Pair of 2 is connected in series then this pair of 2 is connected in parallel. This combination is done because it gives most effective output among all combinations. Disk magnets rotate over this coils and by flux generation electricity is produced.



Electricity producing Circuit

3.3 DC-AC CONVERSION / battery charging unit

Over the years, alternating current has been the common choice of power supply. AC is popular because the voltage can be easily stepped up or down using a transformer. Due to the inherent properties of a transformer, DC voltage cannot be altered using this type of equipment. Transformers operate due to a changing magnetic field in which the change in magnetic flux induces a current. Direct current cannot provide a changing magnetic field therefore a transformer with an applied DC input would only produce heat. The output from the maglev windmill will be an alternating voltage. This output can be directly connected to load or can be converted to dc and stored in a battery for later use.

4. WORKING PRINCIPLE

It Operates on the repulsion characteristics of permanent magnets

By placing these two magnets on top of each other with like polarities facing each other, the magnetic repulsion will be strong enough to keep both magnets at a distance away from each other.

The force is strong enough to balance the weight of an object depending on the repelling property of the magnets.

Power will then be generated with an axial flux generator, which uses permanent disk magnets and coils. The generated power in form of DC, stored in battery

This can be used to directly supply the DC loads and can also be converted to AC using inverter to supply AC loads.

Solar panel is connected to this assembly. The output of solar is stored in battery. Then total electricity generated is then used in combined format.

5. RESULTS

Maglev Turbine

Reading no.	Time(sec)	Wind Speed(m/s)	Voltage(volt)
1	60	5	10
2	60	4	8
3	60	5	12
4	60	8	15
5	60	7	14

Solar Panel

Reading no.	Time in Clock	Voltage (volt)
1	9.00 am	9.5
2	1.00 pm	10.2
3	3.00 pm	10
4	4.00 pm	9.8
5	6.00 pm	8.8

6. ADVANTAGES

1. This Project gives 230 volt output main advantage.
2. no harm to birds and noise
3. Accepts wind from any angle.
4. Better answer to rapidly changing winds.
5. Components can be mounted at ground level
6. Ease of service
7. Lighter weight towers
8. Virtually silent operation.

7. DISADVANTAGE

1. Regular Maintaince needed for turbine
2. Solar panel cost.

8. APPLICATION

1. in house use
2. poratable so we can use it on car ,train.
3. Streetlamps

4. Hotels
5. College campuses.

9. FUTURE SCOPE

1. We can fix this maglev turbine with solar power on forts. Where it is very hard to transmit electricity. At such places .
2. We can use this maglev turbine near highways where due to speedy vehicles maglev will rotate at high speed and generate large amount of electricity continuously.
3. We can fit electricity producing plate on other side of maglev also. Output will be doubled if we implement this.
4. We can provide guide vanes before blades to increase velocity rate.
5. In future speed control of turbine will be the most important issue. Because it is very important when due to uncontrolled air turbine rotates at max speed it will break . so it is very important to control the speed of maglev turbine.

10. CONCLUSION

MAGLEV AND SOLAR wind energy conversion systems are practical and potentially very contributive to the production of clean renewable electricity from the wind even under less than ideal sitting conditions.

It is hoped that they may be constructed used high-strength, low- weight materials for deployment in more developed nations and settings or with very low tech local materials and local skills in less developed countries.

The MAGLEV wind turbine designed is ideal to be located on top of a bridge or bridges to generate electricity, powered by wind.

The elevated altitude gives it an advantage for more wind opportunity. With the idea on top of a bridge, it will power up street lights and or commercial use. In most cities, bridges are a faster route for everyday commute and in need of constant lighting makes this an efficient way to produce natural energy.

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