



# PHOTOVOLTAIC BASED ELECTROMAGNETIC BRAKING SYSTEM

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**ABSTRACT:** Electromagnetic braking system means it uses the magnetic and electronic power to apply brakes. principle of electromagnetism to achieve friction less braking, hence requires less maintenance and oiling. This tends to increase the life span and reliability of brakes since no friction leads to less wearing out of brakes. It is quite smaller in size compared to the traditional braking systems. The motivation behind the proposed use of these brakes in vehicles is that it is frictionless so less maintenance cost due to no friction and no oiling, a technological replacement for traditional braking systems. Also this braking system is guaranteed to apply brakes to the vehicle while traditional braking systems are prone to slipping. So this technology is a preferred replacement for traditional braking without friction or need of lubrication. A magnetic flux when passed in a direction perpendicular to the rotating direction of the wheel, eddy current flows in a direction opposite to the rotation of the wheel. This achieve electromagnetic braking system by creating an opposing force to the wheel rotation and in turn slows down the wheel.

**Index Terms - Photovoltaic, Electromagnetic braking system, Friction less.**

## I.INTRODUCTION

The invention of Electric vehicle is a miracle, they are also known as green vehicles as it produces zero emissions to the air which means there are no toxic gases release from the air that causes the ozone layer depletion. Nowadays the population of electric vehicles starts increasing according to the demand in the market. Besides, the enforcement by the government toward the production of electric vehicle is getting serious. In twentieth century, vehicular technology such as engine technology an integrative technology have been developed aggressively. Somehow, the limitation of driving mileage still becomes an obstacle for the development of electric vehicles. This problem had been tackle by using regenerative braking system, it has become one of the ways to improve the driving range as this method can increase an EV's driving range by 82.5%. This technology had mostly replaced the traditional braking system in vehicles because the traditional braking system always utilizes mechanical friction method to dissipate kinetic energy as heat energy in order to achieve the effect of stopping. Based on the energy perspective, kinetic energy is a surplus energy when the electric motor is in the braking state since it dissipated the energy as the heat and causes a loss of overall energy. This wasted energy actually can be converted to a useful energy especially for the hybrid and electric vehicle. There are several advantages of regenerative braking taken over the traditional braking system such as: More control over braking. More efficient and effective in stop and go driving conditions. Prevents wear on mechanical brake system.

## II.LITERATURE SURVEY

Innovative Electromagnetic Braking System by Sevel P and S Mukesh published in International Journal of Innovative Research in Science, Engineering and Technology (IJIRSET), Volume-3 in April 2014. Mr .Sevel P and S Mukesh Et al find that the electromagnetic brakes can be used as an auxiliary braking system along with the friction braking system to avoid overheating and brake failure. These electromagnetic brakes can be used in wet conditions which eliminate the anti- skidding equipment. Hence, the braking force produced in this is less than the disc brakes if can be used as a secondary or emergency braking system in automobiles. Enhancement of Braking system in Automobile using Electromagnetic Braking by Akshya S Puttevar and Nagnath U published in ISOR Journal of Mechanical and Civil Engineering ( ISOR-MCE) in 2009, conference held at Dr Babasaheb Ambedkar College Of Engineering And Research Wanadongri Nagapur. Mr. Akshaya S Puttevar and Nagnath U analyse that Electromagnetic braking system is found to be more reliable as compared to other braking system. In oil braking system or air braking system, even a small leakage may lead to complete failure of brakes. While in electromagnetic braking system as four-disc plates, coils and firing circuits are attached individually on each wheel, even any coil fails the brake doesn't completely fails remaining three coils works properly.

Electromagnetic Braking System by William Gaskey Sandip mistry Jee Yon in the year 2008. In the area of the develop brakes with low cost and greater performance that results in Electromagnetic field dispersion. Design and analysis of eddy current brake for high speed railway track by Hong Je Ryoo and Geun Hie Rem in the year 2007. In the area of interest Electromagnetic magnetic braking in high speed railway train that results in Constant torque is generated all over the speed range.

### Outcome of literature survey

- By the literature Survey we came to know that the main objective of this work is an electromagnetic brake can be customized to provide fast action, precise engagement, and smooth, backlash-free operation.
- Lower costs. By reducing component wear and improving brake efficiency, electromagnetic braking solutions last longer and require considerably less maintenance.
- Improved heat dissipation

### III.PROBLEM STATEMENT

#### Current situation

The main problem with conventional braking was, when a driver applies brakes all the wheels got lock resulting in losing control over steering as one can steer vehicle only when the wheels are rotating. The second major problem with conventional braking was skidding of vehicle. When the driver applies brakes and all or front wheels or rear wheels are locked there is a major possibility of skidding of vehicle. The third major problem with conventional braking system was stopping distance of vehicle while braking. There are many emergency situations while driving, a driver should stop vehicle completely. At when the stopping distance must be least not larger distance

### IV.OBJECTIVES

- To make use of solar energy as main power source in future EV vehicles.
- So to reduce carbon foot print contribution of each individuals of everyday life .
- To minimize the extra braking setups in four wheel vehicles.
- To achieve noiseless braking process.
- To replace friction based braking system.
- To achieve heatless braking process.
- To achieve successful braking of vehicles in least distance

### V.METHODOLOGY

Electromagnetic braking means applying brakes using electronic and magnetic power. Here we use the principle of electromagnetism to achieve friction less braking. Traditional braking systems are prone to slipping while this one is guaranteed to apply brakes to the vehicle. So without friction or need of lubrication this technology is a preferred replacement for traditional braking. Also it is quite smaller in size compared to the traditional braking systems. To make electromagnetic brakes work, a magnetic flux when passed in a direction perpendicular to the rotating direction of the wheel, we see eddy current flowing in a direction opposite to the rotation of the wheel. This creates an opposing force to the wheel rotation and in turn slows down the wheel. Thus we achieve electromagnetic braking as a better braking system for future automobiles

#### Advantages

Photovoltaic Electromagnetic Braking System has several advantages compared to the traditional braking systems are:

- This type of braking system is free from friction i.e frictionless braking system .
- Potential hazard of tire burst due to excess temperature is prevented.
- Easier integration with anti-lock traction system.
- It requires less maintenance.
- Noise produced is minimum.
- Simple in design and construction.
- High degree of safety

#### Limitations

- Electromagnetic braking system doesn't function well on RPM's as eddy current generated is of low power.
- Large amount of electricity is needed for heavy braking, hence the battery life is reduced.

#### Applications

- Used in the Railway System.
- Used in industrial lifts.
- Used in Automobiles.
- Used in Roller coasters and other theme park rides .
- Used in Heavy duty trucks .
- It can be applied to aeronautic applications.
- Slowing down a airplane on carrier ship.
- Can be used for any road vehicles.
- Used in lift controlling system.

## VI.CONCLUSION

An Electromagnetic Braking System could substantially increase the braking efficiency while reducing the friction brake wear. Bringing this technology to the market would create extra revenue for the automobile's companies. Most potential truck owners will consider this braking system ,since it reduces upkeep and cost of traditional brakes and increases truck safety. Electromagnetic braking system represents the future of braking technology.

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