BRAKING SYSTEM USING ELECTRO-MAGNET

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ABSTRACT

Magnetic force is used to engage the brake in an Electromagnetic Braking system, but the braking power is manually transferred. The electromagnet is positioned on the frame and attached to the disc by a shaft. When electricity is given to the coil, a magnetic field is created across the armature as a result of the current running through it, causing the armature to be attracted to the coil with the ultrasonic sensor. As a result, torque is created, and the car eventually comes to a halt. The benefits of using an electromagnetic braking system in a vehicle areinvestigated in this study. As an auxiliary brake, these brakes can be used on heavy trucks. Controlling the current delivered to the electromagnetic brakes allows them to be used in commercial vehicles.

KEYWORDS-Electro-Magnet, Regenerative braking , Ardino-Uno

1.NTRODUCTION

A brake is a device that slows or stops movement. A clutch is its polar opposite. Friction is the most prevalent technique of converting kinetic energy into heat in brakes, however other types of energy conversion may also be used. Regenerativebraking, for example, turns a large portion of the energy into electrical energy, which can then be stored for later use.

1.2 PROBLEM DESCRIPTION

We're creating a "Test rig on Eddy-Current braking system," which is a portablepiece of equipment that may be utilised as a frictionless braking system.
Faraday's law and the Lorentz principle are the foundations of this system.

OBJECTIVES:

Construction of a test rig
It ought to be simple to use.
The test rig should provide precise and reliable data. It has to be tough and unyielding.

2.LITERATURE REVIEW

Oscar Rodrigues et al. [2016] The goal of the research was to compare theoretical and practical braking times in order to determine a practical air gap limit beyond which electromagnetic brakes losetheir effectiveness.

Baoquan Kou et al [2015] A unique hybrid excitation linear eddy current brake for high-speedroad and rail

vehicles is proposed in this work as a braking system. In comparison to electric excitation linear eddy current brakes, the hybrid excitation linear eddy current brake has a higher force density and lower excitation loss.

Arunesh Kumar Singh et al [2014] This work examined many types of Eddy Current Braking Systems in detail. ECBS has been examined in a variety of applications, including high-speed railwayretarders, automotive retarders, dampers, couplers, and the air bearing system. The performance of ECBS is influenced by several design characteristics.

Yasuaki Sakamoto et al [2008] The focus of this work is on a three-phase permanent magnet synchronous motor (PMSM) drive as well as a one-DOF actively controlled actuator that employs only one three-phase voltage source inverter

3.EXPERIMENTAL SETUP

FIG :- ELECTROMAGNETIC BRAKING SYSTEM

1. **Disc:** The disc is the component of the wheel that connects the rim to the axle hub. The rimand disc can be permanently attached or separated.
2. **Solenoid:** Solenoids are an electric motor type. Heavy-duty relays are often utilised inautomobiles. A solenoid is a device or motor that may produce back and forth, or linear, motion when a force is applied, according to the technical definition. Solenoids can be activated by hydraulic, pneumatic, or electrical pressure.
3. **Arduino Uno:** Arduino UNO is a low-cost, flexible, and easy-to-use open-sourceprogrammable microcontroller board that may be used in a wide range of electronic applications. This board can operate relays, LEDs, servos, and motors as an output and can be interfaced with other Arduino boards, Arduino shields, and Raspberry Pi boards.
4. **Battery:** An electric battery is a power source that consists of one or more electrochemical cells connected to the outside world to power electrical equipment. The positive terminal of a battery is the cathode, whereas the negative terminal is the anode, while it is delivering electricity.

4.WORKING PRINCIPLE

The magnetic flux draws the armature to the face of the brake when power is provided to an electromagnet's coil. The inner and outer friction discs are squeezed together while it does so. In most cases, the hub is attached to the spinning shaft. The brake housing is firmly attached to the machine frame.

Diameter of the driving pulley = .085 m=d Diameter of the driven pulley = .05 m=D Speed of the driving pulley = 1800 rpm=N1 Material of the belt = fabric
Material of the pulley = plastic.

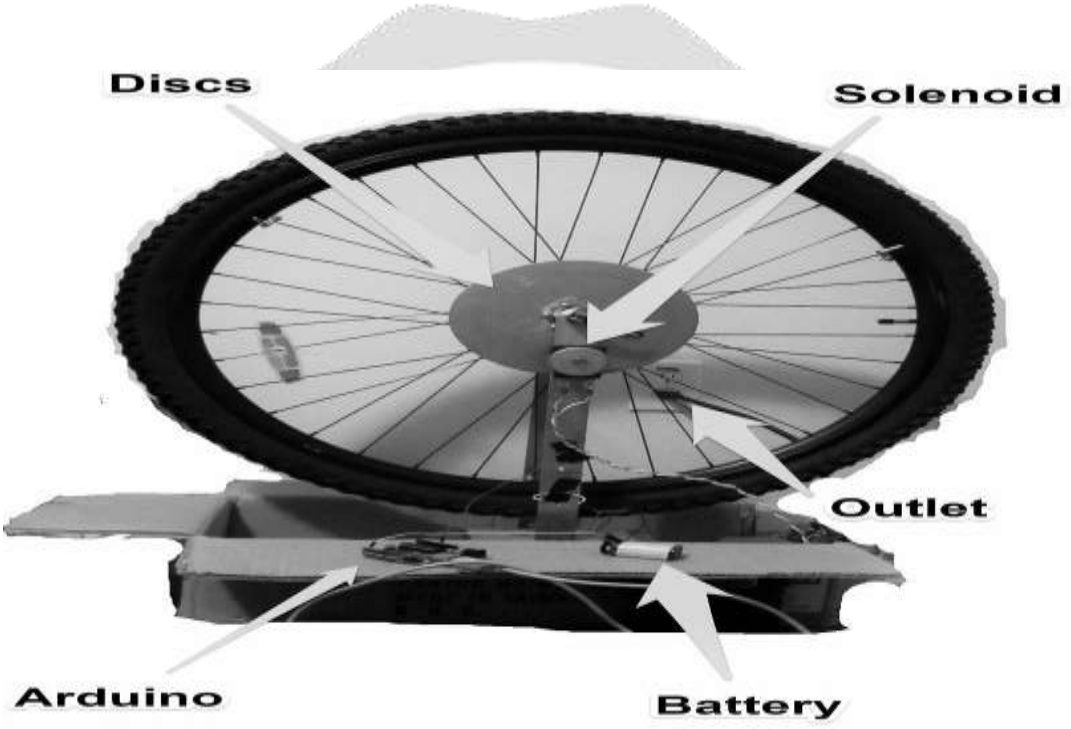

FIG :- ELECTROMAGNETIC BRAKING SYSTEM

5 .APPLICATION

5. Electromagnetic Braking System are used for:
6. Already in use under some railway system.
7. Can be used for any road vehicles.
8. Equally applicable to heavy and light vehicle.
9. Used in crane control system.
10. Used in lift controlling.

6 .RESULTS AND CONCLUSION

Ordinary brakes, which rely on mechanical blockage, can result in three major issues: skidding, vehicle wear and tear. Ordinary brakes, which have these shortcomings, may be avoided by a simple and effective stopping system mechanism called an eddy current brake. This eddy current brake is an abrasion-free approach that can be used in vehicles, including trains. Another benefit is the high level of dependability and safety. Even under the worst climatic circumstances, this innovative and effectivebraking mechanism can work.

FUTURE SCOPE

A revolutionary invention is made in the field of brakes. The Electromagnetic brakes are excellent replacement for conventional automobile brakes. The use of Electromagnetic brakes can be done forlighter vehicles also. With some modification, a regenerative braking system can be equipped with the Electromagnetic brakes. The Electromagnetic brakes are the future of automobile brakes.

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REFERENCES

[1]. H. VanOostveen and R. Siezen, "ErfahrungenmitPermanentmag-net-Schienenbremsen", GlasersAnnalen, Nr 12, S. 613-617, 1997.

[2]. Gagarin, G., Kroger, U. and Saunweber, E., ''Eddy-current magnetic track brakes for high-speed trains,'' Joint ASME/IEEE/AAR Railroad Conference, pp. 95–99, 1987.

[3]. Ohyma, T., ''Adhesion at higher speeds, its basic characteristic, its improvement and somerelated problem,'' Japanese Railway Engineering, Vol.108, 1988.

[4] McConnell, H.M., ''Eddy-current phenomena in ferromagnetic material,'' AIEE Transactions, Vol. 73, part I, pp. 226–234, July 1954.

[5] Kesavamurthy, N., ''Eddy-current in solid iron due to alternating magnetic flux,'' TheInstitution of Engineers Monograph, No. 339U, pp. 207– 213, June 1959,

[6] Biro, O. and Preis, K., ''Finite element analysis of 3-D eddy current,'' IEEE Transactionson Magnetics, Vol. 26, No. 2, pp. 418–423, Mar 1990.

[7] Heald, M.A., ''Magnetic braking: improved theory,'' American Journal of Physics, Vol.56, No. 6, pp. 521–522, 1988.