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"Electromagnetic Breaking System using Ultrasonic Sensor"

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Abstract*:* Brakes could be the crucial parts in most of the moving system that are generally used to slow down or stop the motion of the any moving system. Braking system uses the friction force to the kinetic energy of a moving parts into heat by the use of the brake pads Using of these type of friction braking leads to rise in temperature of brake pads, these leads to effecting the effectiveness of the braking system. By overcoming these effects we use electromagnetic braking In this project, we have to use eddy current braking in vehicle to stop the vehicle by non-contracting type. This braking system is friction-less, it has an advantages over the ordinary braking system in the performance and maintenance

Keywords: Ultrasonic Sensor, Actuator, Automatic Braking, Ultrasonic Emitter, Microcontroller Chip, Safe Driving.

I. INTRODUCTION

Towards green technology, which focused on the importance of environment conservation, a move to a new braking system is needed. A new braking system to replace the current braking system which used to reduce the air pollution.
Realizing the importance of a new braking system that could lead into environmental friendly and reduce common problems. Eddy current braking was said as environment friendly because it can reduce the pollution of wear debris from brake pad itself.
Eddy current is one of the most important phenomena which can be applied in various kinds of research and application. On the other hand, it provides resistance proportional to the speed. The principle behind the operation of an eddy – current brake relates to basic Electromagnetic Induction Theory**.**
This experiment was conducted to study the behaviour of eddy current braking system which uses an electromagnet and aluminium as the brake disc material.
The eddy current braking occurred when a magnetic drag force is produced to slow down the motion when a conducting material is moving through a stationary magnetic field. The changing magnetic flux induces eddy currents in the conductor and these currents dissipate energy and generate drag force.
The interaction of two magnetic fields causes a force that resists the change in magnetic flux. A nearby conductive surface will exert a drag force on a moving magnet that opposes its motion, due to eddy currents induced in the surface by the moving magnetic field.
Therefore, there are no contacting elements by using this electromagnetic braking system which will lead to reduce the wear of brake pad.

II. PROBLEM STATEMENT

Towards green technology, which focused on the importance of environment conservation, a move to a new braking system is needed. A new braking system to replace the current braking system which used to reduce the air pollution.
Realizing the importance of a new braking system that could lead into environmental friendly and reduce common problems. Eddy current braking was said as environment friendly because it can reduce the pollution of wear debris from brake pad itself.
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III. OBJECTIVE

The main objective of our project is to design of an Electromagnetic Braking System model
Besides the main objective, following are our secondary objectives:-
To understand project planning and execution
To understand the fabrication techniques in a mechanical workshop
To understand the usage of various mechanical machine tools and also measuring tools
To make day to day human life more easier by proper use of technology
Our design overcomes the previous system which was very in very high cost
Simple in construction
Less space required
Low energy consumption
No need of skilled persons

IV. LITERATURE REVIEW

Yash Gandhi et al. [2021], In this reference we get summarised that most of the braking systems utilize friction forces to transform the kinetic energy of a moving body into heat that is dissipated by the braking pads. The overuse of friction-type braking systems causes the temperature of the braking pads to rise, reducing the effectiveness of the system. The eddy-current is created by the relative motion between a magnet and a metal (or alloy) conductor. The current induces the reverse magnetic field and results in the deceleration of motion. The changing magnetic field will induce eddy currents in the conductor. The proposed mechanism implements this phenomenon in developing a braking system. It is found that the larger thickness of disc, a greater number of turns of electromagnet and higher electrical conductivity of conductor influences the generation of greater braking torque. Greater the speed greater the efficiency.

V. WORKING

Intelligent braking system consist an ultrasonic sensor provided on the front side of the car producing and emitting ultrasonic waves. An ultrasonic receiver also placed on the front side of the car receiving ultrasonic wave signal. The microcontroller is used to control the speed of the vehicle based on the detection pulse information to push the brake pedal and apply brake to the car sudden for safety purpose. The quick response time provided by the electronic control can be used for shorten the braking distance by introducing advance control of braking system operation. The control of commercial vehicle braking system operation is related not only to vehicle speed but also to yaw moment control and significantly reducing the possibilities of the vehicle rolling over.

a) Ultrasonic Sensor

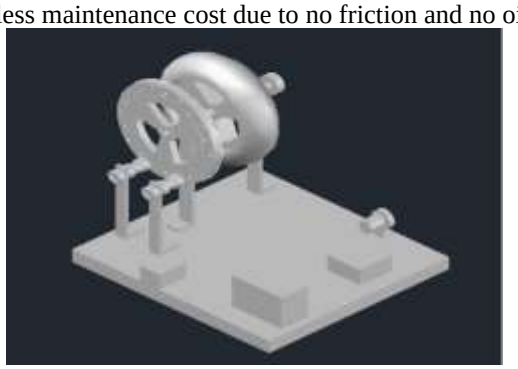
This sensor is fitted in front side of the vehicle. This sensor gets switched on once the vehicle is started and the sensor gives out the analog output 3continuously depending on the position of obstacle. Specification:
Range: 0.005-4 m Resolution: 12 inches Signal Output: 0-5 V Excitation Voltage: 12-24 V

b) **Microcontroller**

The whole control of the system is in the hands of ATMEGA- 60 microcontroller. A microcontroller is a computer on a chip. It is a type of microprocessor is cost effectiveness, in contrast to a general purpose microprocessor.

c) **Brake**

Disc brakes will be utilized for breaking the vehicle. Here we use the principle of electromagnetism to achieve friction less braking. This tends to increase the life and reliability of brakes since no friction to less wearing out of brakes. Also it requires less maintenance and oiling. This is an upcoming technological replacement for
traditional braking systems. This is less maintenance cost due to no friction and no oiling.



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When the power supply is given the motor, it will rotate the main shaft by using belt pulley system, aluminum plate is welded with shaft it is rotated in front of the electromagnet. When the braking is required the control switch is turned on. So, the current or voltage is applied on the electromagnet.
A magnetic field is created by an energizing coil by the application of voltage or current. This coil develops magnetic lines of flux between the metal disc thus attracting the armature to the face of the disc. When the current or voltage is removed from the brake (electromagnet) the disc is free to rotate.

VI. RESULT

By using the electromagnetic brake as supplementary retardation equipment, the friction brakes can be used less frequently, and therefore practically never reach high temperatures. The brake linings would last considerably longer before requiring maintenance, and the potentially "brake fade" problem could be avoided. In research conducted by a truck manufacturer, it was proved that the electromagnetic brake assumed 80 percent of the duty which would otherwise have been demanded of the regular service brake.
Furthermore, the electromagnetic brake prevents the dangers that can arise from the prolonged use of brakes beyond their capability to dissipate heat. This is most likely to occur while a vehicle descending a long gradient at high speed. The installation of an electromagnetic brake is not very difficult. It does not need a subsidiary cooling system. It does not effect on the efficiency of engine. Electromagnetic brake also has better controllability. Thermal stability of the electromagnetic brakes is achieved by means of the convection and radiation of the heat energy at high temperature. The electromagnetic brakes have excellent heat dissipation efficiency. Electromagnetic brakes have better thermal dynamic performance than regular friction brakes.

VII. CONCLUSION

Electromagnetic braking system is superior to conventional frictional braking as there is no any friction and heat in electromagnetic braking system. The combination of eddy current and magnetic forces makes this brake more effective. This brake can be used as auxiliary brake system in vehicle

REFERENCES

1. H. Van Oostveen and R. Siezen, "ErfahrungenmitPermanentmag-netSchienenbremsen", GlasersAnnalen, Nr 12, S. 613-617, 1997.
2. Biro, O. and Preis, K., „„Finite element analysis of 3-D eddy current,"" IEEE Transactions onMagnetics, Vol. 26, No. 2, pp. 418–423, Mar, 1990.
3. Ohyma, T., „„Adhesion at higher speeds, its basic characteristic, its improvement and somerelated problem,"" Japanese Railway Engineering, Vol. 108, 1988.
4. A B Sharkawy (2010), "Genetic FuzzySelf-tuning PID Controllers for Antilock Braking Systems" EngineeringApplications of Artificial Intelligence, Vol. 23, pp. 1041-1052.
5. A Poursamad (2009), "AdaptiveFeedback Linearization Control ofAntilock Bracking System Using NeuralNetworks", Mechatronics, Vol. 19, pp. 767-773.
6. S.N. Sidek, M.J.E. Salami Kulliyyah of engineering IIUM "Design of Intelligent Braking System"
7. Raza H, Xu z, and Ioannou P., "Evaluation of cooperative Driving System"
8. Collier W.J. and Weiland, R.J. "Smart cars Smart Highways"
9. Gerard Gissinger, Christian Menard, Alain Constans "A Mechatronic Conception of a New Intelligent Braking System"

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