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Accidents Avoiding System Indicator Due To Brake Failure

K.Mohan[1] and G.Pugazhendhi[2]

[1]*Department of Mechanical Engineering, IFET College of Engineering, Villupuram, Tamilnadu, India.*
[2]*Department of Mechanical Engineering, IFET College of Engineering, Villupuram, Tamilnadu, India.*

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ABSTRACT

Brakes are implemented in cars to stop the vehicle. The increase in number of deaths and accidents is due to brake failure. Hydraulic Brake failures mainly occur due to oil leakage and results in pressure loss. The aim of our paper is to diagnose faulty braking system and application of an auxiliary secondary braking system in case of brake failures. This project helps in ensuring the safety of the passengers before the failure occurs and helps in preventing accidents. The brake failure alarming system is empowered by electronic control unit. When the primary hydraulic disc brake fails , the sensor detects the pressure loss and gives warning signal to the driver and also activates power supply to the secondary braking unit which is a hub motors in rear wheels. This functions as a secondary braking unit and helps the driver to stop the vehicle and thus ensures safety of the passengers. The project also includes the stopping of vehicle by switching off the supply of the ignition to the engine.

Keywords: Engine, Hydraulic disc brake, Ignition and Vehicle.

1. INTRODUCTION

Brake

Brake is a device which is used to bring to rest or slow down a moving body. Safe operation of vehicles demands dependable brakes. Brake is required to absorb the kinetic energy of the moving parts or the potential energy of the objects being lowered by hoist when the rate of descent is controlled. The absorbed energy is dissipated in the form of heat.

Types of Braking

The brakes for automotive use may be classified according the following considerations:

- Purpose
- Location
- Construction
- Method of actuation
- Extra braking effort

Based on the above considerations, brakes are classified with respect to following factors.

1. With respect to application
- Foot brake
- Hand brake

2. With respect to number of wheels
- Two wheel brake

3. With respect to the method of braking contact
- Internal expanding brake
- External contracting brake

4. With respect to method of applying the braking force
- Single acting brake
- Double acting brake

5. With respect to the brake gear
- Vacuum brake
- Air brake
- Hydraulic brake
- Hydrostatic brake
- Electric brake

6. With respect to power transmission
- Direct acting brake
- Geared brake

7. With respect to power unit
- Cylindrical brake
- Power brake

The foot brake or service brake is always sexual orientation and so forth. It is particularly worried by many individuals that associations, managers, training framework may utilize such models and begin segregating individuals in light of numerous human arranged parameters. One of the real uses of huge information is promoting where the advertisers attempt to put their items and administrations before profoundly focused on clients. In any case, when the client is classified into one classification in view of their practices, there is probability for damage. Disregarding the likelihood for damage, advertisers still utilize huge information to go for individuals via web-based networking media stages like web indexes and email. Mighty passage into individual range by giving promotions in view of companions, likes and email substance is bringing on nervousness among shoppers. Secure calculations in appropriated programming structures. The primary recognized hazard delves into the security of computational components in structures, for example, Map Reduce, with two particular security concerns delineated. To start with, the dependability of the "mappers," which are the code that breaks information into pieces, dissects it and yields key-esteem sets, should be assessed. Second, information cleansing and de-recognizable proof capacities should be

actualized to keep the capacity or spillage of delicate information from the stage ought to be executed through information sharpening what's more, de-recognizable proof. Undertakings utilizing complex apparatuses, for example, Map Reduce should utilize devices, for example, Mandatory Get to Controls inside Selina and de-identifier schedules to finish this; on a similar note, undertakings ought to ask with respect to how cloud suppliers are controlling and remediating this issue in their surroundings. Security best practices for non-social information stores. The utilization of No SQL and other expansive scale, non-social information stores may make new security issues because of a conceivable absence of capacities in a few crucial territories, including any genuine confirmation, encryption for information very still or in travel, logging or information labeling, and grouping. Associations need to consider the utilization of particular application or center product layers to authorize validation and information uprightness. All passwords must be scrambled, and any associations with the framework ought to in a perfect world utilize Secure Sockets Layer/Transport Layer Security. Guarantee logs are produced from all exchanges around touchy information also.

The driver has stopped the car by using the foot brake. Its other use is as an emergency brake to stop the car if the foot braked system should fail. The hand or parking brakes operates on a pair of wheels, frequently the rear wheels. When drum type rear brakes are used, the same shoes can be used for both hand and foot control. The drum type of brake may either be a band brake or a shoe brake. Both band brakes and shoe brakes may be either external or internal. The band brakes generally are external and shoe brakes internal. In drum brakes the drum is attached to the wheel and revolves with it. Friction to slow the drum is applied from inside by the shoes which do not rotate but are mounted on a stationary metal back plate. There are different types of drum brakes such as a two leading shoe arrangement – which gives an augmented response to pedal effort because of its self-applying arrangement. A leading-trailing shoe is a cheaper and better alternative as it is equally effective whether the car is going forward or backwards. Manufacturers design drum brakes so that rain, snow or ice or grit cannot get inside and decrease braking efficiency for moisture greatly reduces the friction between the linings and the drum. The dissipate quickly the considerable amount of heat generated when braking a fast moving heavy car large brake drums would be required. Disc brakes do the job more efficiently, for the cooling air can get to the rubbing between each piston and the disc, there is a friction pad held in position by retaining pins, spring plates etc. Passages are drilled in the caliper for the fluid to enter or leave the each housing. These passages are also connected to another one for bleeding. Each cylinder contains a rubber selling ring between the cylinder and the piston. The brakes are applied, hydraulically actuated piston move the friction pads into contact with the disc, applying equal and opposite forces on the later. On releasing the brakes, the rubber sealing rings act as return springs and retract the pistons and the friction pads away from the disc. Now let us see in detail about different braking systems in automobiles.

2. MECHANICAL BRAKE

In a motor vehicle, the wheel is attached to an auxiliary wheel called drum. The brake shoes are made to contact this drum. In most designs, two shoes are used with each drum to form a complete brake mechanism at each wheel. The brake shoes have brake linings on their outer surfaces. Each brake shoe is hinged at one end by on anchor pin; the other end is operated by some means so that the brake shoe expands outwards. The brake linings come into contact with the drum. Retracting spring keeps the brake shoe into position when the brakes are not applied. The drum encloses the entire mechanism to keep out dust and moisture. The wheel attaching bolts on the drum are used to contact wheel and drum. The braking plate completes the brake enclosure, holds the assembly to car axie, and acts the base for fastening the brake shoes and operating mechanism. The shoes are generally mounted to rub against the inside surface of the drum to form as internal expanding brake as shown in the figure

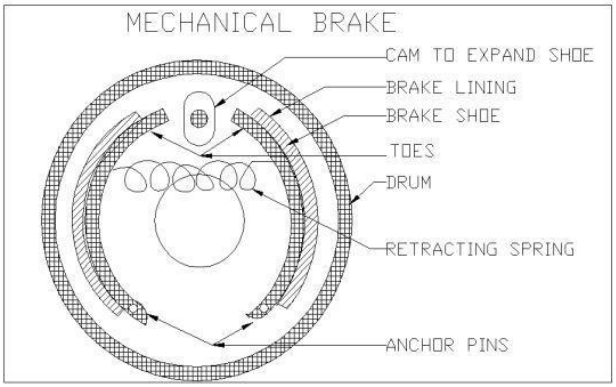

Figure: Mechanical brake

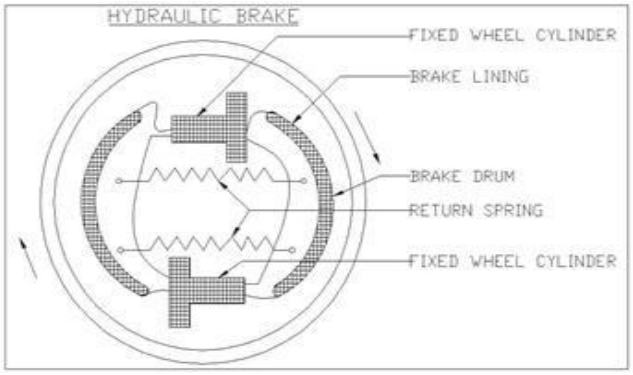

Figure: Hydraulic brake

3. HYDRAULIC BRAKES

The hydraulic brakes are applied by the liquid pressure. The pedal force is transmitted to the brake shoe by means of a confined liquid through a system of force transmission. The force applied to the pedal is multiplied and transmitted to brake shoes by a force transmission system. This system is based upon Pascal's principle, which states that **"**The confined liquids transmit pressure without loss equally in all directions**"**. It essentially consists of two main components – master cylinder and wheel cylinder the master cylinder is connected by the wheel cylinders at each of the four wheels. The system is filled with the liquid under light pressure when

the brakes are not in operation. The liquid is known as brake fluid, and is usually a mixture of glycerin and alcohol or caster-oil, denatured alcohol and some additives Spring pressure, and thus the fluid pressure in the entire system drops to its original low valve.

4. AIR BRAKE

Air brakes are widely used in heavy vehicle like buses and trucks which require a heavier braking effort that can be applied by the driver's foot. Air brakes are applied by the pressure of compressed air, instead of foot pressure, acting against flexible diaphragms in brake chamber. The diaphragms are connected to the wheel brakes. These diaphragms are controlled through a hand or foot operated valve. The brake valve controls brake operation by directing the flow of air from a reservoir against diaphragms in the brake chamber when the brakes are applied and from brake chambers to tube atmosphere when the brakes are released. The air compressor, driven by the engine furnishes compressed air to the reservoir fall below a set valve.

5. ELECTRIC BRAKE

Electric Brakes are also used in some motor vehicles, although these are not very popular. Warner electric brake is one of the examples of such brakes. An electric brake essentially consists of an electromagnet within the brake drum. The current from the battery is utilized to energize the electromagnet, which actuates the mechanism to expand the brake shoe against the brake drum, thus applying the brakes. The severity of braking is controlled by means of a rheostat, which is operated by the driver through the foot pedal. Electric brakes are simpler. These brakes do not require complicated operating linkage. Only cable is required to take current from the battery to the electromagnet. Also, these are very quick in action as compared to other types of brakes.

6. VACUUM BRAKES/SERVO BRAKES

A serve mechanism fitted to the braking system reduces the physical effort the driver has to use on the brake pedal most servo mechanisms are of the vacuum assistance type. A pressure differential can be established by subjecting one side of the piston to atmospheric pressure and the other side to a pressure below atmospheric pressure by exhausting air from the corresponding end of the servo cylinder.

7. REGENERATIVE BRAKING

Electricity powered vehicles use regenerative braking for stopping the vehicle. With regenerative braking pressing the brake pedal does not necessarily activate a conventional friction brake. The motor controller controlling the vehicle is treated as a generator which slows the vehicle and simultaneously provides an output for charging the battery. The effectiveness of regenerative braking falls off with vehicle speed. Electric vehicles will have to be fitted with conventional hydraulic friction brakes as well as with regenerative systems.

8. FACTORS DETERMINING THE CHOICE OF MATERIALS

The various factors which determine the choice of material are discussed below.

- Physical
- Mechanical
- Chemical

9. MATERIAL SELECTION

Properties:

The material selected must possess the necessary properties for the proposed application. The various requirements to be satisfied can be weight, surface finish, rigidity, ability to withstand environmental attack from chemicals, service life, reliability etc. The following four types of principle properties of materials decisively affect their selection.

The various physical properties concerned are melting point, Thermal Conductivity, Specific heat, coefficient of thermal expansion, specific gravity, electrical Conductivity, Magnetic purposes etc. The various Mechanical properties Concerned are strength in tensile, compressive shear, bending, torsional and buckling load, fatigue resistance, impact resistance, elastic limit, endurance limit, and modulus of elasticity, hardness, wear resistance and sliding properties. The various properties concerned from the manufacturing point of view are.

- Cast ability
- Weldability
- Brazability
- Forgeability
- Merchantability
- Surface properties
- Shrinkage and Deep drawing

Manufacturing Case:

Sometimes the demand for lowest possible manufacturing cost or surface qualities obtainable by the application of suitable coating substances may demand the use of special materials.

Quality Required:

This generally affects the manufacturing process and ultimately the material. For example, it would never be desirable to go for casting of a less number of components which can be fabricated much more economically by welding or hand forging the steel.

10. WORKING OF OUR PROJECT

When the primary hydraulic disc brake fails, the sensor detects the oil leakage and gives warning signal to the driver and also activates power supply to the secondary braking unit which is a hub motors in rear wheels . This functions as a secondary braking unit and helps the driver to stop the vehicle and thus ensures safety. Hydraulic brake in vehicles will need the periodic maintenance in order to get the exact output. There is a possibility of oil leakage during running time of the vehicle. Thus in this project include the electrically indicated alarm for the indication of brake failure before the failure occurs by using fluid sensor. Fluid sensor detects the oil leakage in the hydraulic brake and sends the signal to the alarm unit which leads to the alarm indication. At the same time engine ignition should stopped simultaneously secondary braking unit provides the brake for reduced the

speed of the vehicle and it should be done by the ratchet paul mechanism for alternate brake.

In our project we implement both the indication and braking system and it should be helpful for the driver protect from the failure before it occurs. The secondary braking unit is a hub motor unit present at both the wheels of the rear axle. The hub motor also called as wheel hub drive is an electric motor incorporated into the wheels of the vehicle. Hub motors have their highest torque when they start. When the relay receives positive value from comparator, it connects the power source to the hub motor. The hub motor rotates in a direction opposite to the direction of rotation of the wheels. Therefore the hub motor provides negative torque to the wheels and retards the output power of the wheels. Thus the wheels are slowed down and the vehicle is stopped.

In this project we have fix the axle which will be driven by a ac motor in order to show the rotary motion. Inspite of engine the ac motor will be connected with shaft by belt drive. Near the hydraulic brake there will be placed the fluid sensor near it. The ratchet pawl mechanism also included in the axle shaft. The electronic circuit will monitor or acquire the data from the sensor. If the sensor provides the indication about the oil leakage, then the control unit will stop the motor and the ratchet pawl mechanism will activate to stop the axle.

11. RATCHET PAUL MECHANISM

Ratchet mechanism is based on the wheel that has teeth cut of it and a paul that follows as the wheel turns .ratchet wheel turns and paul that follows into the dip between the teeth. The ratchet wheel can turns only in one direction in the anticlockwise direction.

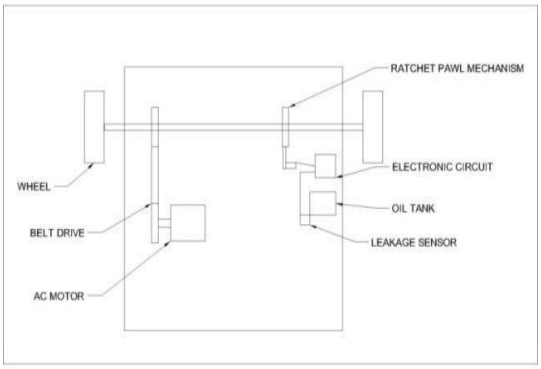

Figure: Working model

12. ELECTRONIC CIRCUIT

Microcontroller

A microcontroller is a Self-contained system with peripherals, memory and a processor that can be used as an embedded system. Most programmable microcontrollers that are used today are embedded in other consumer products or machinery including phones, peripherals, automobiles and household appliances for computer systems. Due to that, another name for a microcontroller is "embedded controller." Some embedded systems are more sophisticated, while others have minimal requirements for memory and programming length and a low software complexity. Input and output devices include solenoids, LCD displays, relays, switches and sensors for data like humidity, temperature or light level, amongst others.

13. CONCLUSION

The leakage of brake oil can be identified and the identification will be done as planned for the project. From this project we can conclude that there is a solution to avoid brake failure due to brake oil leakage. By adding the ratchet and pawl mechanism we also manage the braking system to stop the vehicle while the vehicle is running. It provides the alternate way for the usage of brake if failure occurs. Thus we diagnose the faulty braking system and indicate by a alarm unit, develop a control system using the micro controller, fluid sensor and application of an auxiliary braking system in case of brake failure occurs. it gives the way for the usage of the hydraulic brake again in the automobiles because this project indicates the failure before occurs then use the auxiliary braking system for the protection from the failure of brakes. The increase in number of deaths and accidents is due to brake failure should be reduced. Even though the maintenance should be done the failure should occurs for that reason before failure occurs the indication should be done by the alarm unit then the maintenance should be done easily and the regular maintenance should be reduced.

Future scope of this project is to implement the regenerative braking system inspite of ratchet paul mechanism in secondary braking system which gives the way for usage of brakes in efficient manner.

Advantages:

- Preventing accidents.
- Avoid periodic maintenance, immediate action could be taken and Safety of passengers is ensured.

Disadvantages

- Additional electronic circuit will be needed.
- Space to be occupied by sensor should be designed while implementation.
- Initial cost will be high.

Applications

- Can be used in cars used in travel agencies to reduce periodic maintenance of vehicle.
- Also can be used for tanks to avoid leakage of fuels.

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