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# Review On Hydraulic Brake Failure Indicator And Emegency Braking

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## Abstract

Nowadays accidents may occur due to various reasons, the foremost reason is brake failure and is caused due to poor maintenance as well as product defect. In order to safe guard the valuable human life from these accidents; there is a need for monitoring of braking system in automobiles. Vehicle safety is the avoidance of automobile accidents or the minimization of harmful effects of accidents, in particular related to human life and health. Special safety features have been built into vehicles occupants only, and some for the safety of others.

Automobiles have been the primary mode of transportation for most of us and we depend on them for our day to day commute. Brake failure indicator circuit is a circuit that constantly monitor the condition of brake. The sensor which is attached to the circuit of a brake failure by monitoring the brake switch and reminds you the condition of brake every time when brake is applied. This mechanism involves a Brake wire which runs from

the brake lever to the braking mechanism set-up of the vehicle. It is this wire that gets pulled when we apply brakes to stop our vehicle.

The sensor is used to detect the break wire, the control signal to the alarm unit. Similarly the auxiliary brake is fixed to the wheel frame and this can apply the brake and stop the vehicle. The microcontroller analyses the signal and operates the corresponding indicator and gives warning signal to the driver and also activates power supply to the secondary braking unit which is a disc brake supported with actuator and a 12 volt battery is used . This functions as a secondary braking unit and helps the driver to stop the vehicle and thus ensures safety of the passengers.

**Keywords: Kinetic energy,Potential energy, Electric current, Auxiliary Braking System, Buzzer**

## 1.**Introduction**

A brake is a mechanical device that inhibits motion by slowing down a body or by slowing it. Brakes retard the motion of a body creating friction between two working surfaces and convert the kinetic energy of the moving body into heat.

Sometimes brake failure may occur when the brake lining is cut-off. Most brakes commonly use friction between two surfaces pressed together to convert the kinetic energy of the moving object into heat, though other methods of energy conversion may be employed.

For example, regenerative braking converts much of the energy to electrical energy, which may be stored for later use. Other methods convert kinetic energy into potential energy in such stored forms as pressurized air or pressurized oil. Eddy current brakes use magnetic fields to convert kinetic energy into electric current in the brake disc, fin, or rail, which is converted into heat. Still other braking methods even transform kinetic energy into different forms, for example by transferring the energy to a rotating flywheel.

Brakes are generally applied to rotating axles or wheels, but also take other forms such as the surface of a moving fluid (flaps deployed into water or air). Some vehicles use a combination of braking mechanisms, such as drag racing cars with both wheel brakes and a parachute, or airplanes with both wheel brakes and drag flaps raised into the air during landing.

The aim of this work is to design a braking system with indicator. Brake failure occurs only because of worn out of brake shoe and cut in liner. This system provides audio and visual alert when the brake fails.

## 2.Problem Statement :

Our problem is that we don't have brake failure indication system in automobile, so to overcome the brake failure we have to do..,

i. To design an Automobile Brake Failure Indicator with Auxiliary Braking System for a drum brake system and test it.

ii. To modify mechanism of Car system to make it more safe.

iii. To make effective braking system.

iv. Increase safety at while driving vehicles.

v. Conceptual design for future electric vehicles.

## 3.Objective:

The main objective of this project is to avoid accidents due to brake failure. The specific objectives of this project were:

i. To design an Automobile Brake Failure Indicator with auxiliary disc brake for a drum brake system.

ii. To create a 3D model for the same.

iii. To observe the working of the system.

iv. For the protection of lively hood.

v. To connect the audio visual indicator with a limit switch to the lever of tyre drum.

## 4.Literature Review:

Project is fully equipped and designed for safety of the automobile vehicles. Automatic brake failure indicator and braking system is the most effective solution to this problem. It is the most effective and the simplest methodology used to reduce the rate of accident due to brake failure.

In this system the components used are two-way relay, buzzer, battery, motor, wiring system. And finally, the braking system installed in the two-wheeler by using these components the most effective system is to be generate.

In this system, if brake failure is occurred then the buzzer gives the indication to the driver in the form of sound and simultaneously alternative braking system start their working and apply the secondary brakes by using motor fitted to the chassis, as the result of these the speed of the vehicle gets reduced and vehicle is stop in some second.

The main advantage of the system is that it is compact in size, and the installation cost is very less. If this system is installed in vehicle then accident due to brake failure gets reduced, as the result of these the rate of accident due to brake failure get reduces.

**K.Mohan1 and G.Pugazhendhi** Department of Mechanical Engineering, IFET College of Engineering, Villupuram, Tamilnadu, India. Article Received: 07 June 2017 Article Accepted: 27 June 2017 Article Published: 01 July 2017 had conclude that project is fully equipped and designed for safety of the automobile vehicles. Automatic brake failure indicator and braking system is the most effective solution to this problem. In this system the components used are two-way relay, buzzer, battery, motor, wiring system. And finally, the braking system installed in the two-wheeler by using these components the most effective system is to be generate. In this system, if brake failure is occurred then the buzzer gives the indication to the driver in the form of sound and simultaneously alternative braking system start their working and apply the secondary brakes by using motor fitted to the chassis, as the result of these the speed of the vehicle gets reduced and vehicle is stop in some second.

**Dr.N.Venkatachalapathi1, V. Mallikarjuna2** Professor and Head1, Assistant Professor2 Department of Mechanical Engineering, Annamacharya Institute of Technology & Science, Rajampet, and A.P – India has founded that an Automatic Brake Failure Indicator and Over Heating Alarm The braking system of a car is undoubtedly one of its more important features. The aim of this work is to create a better braking system with indicator. Brake failure occurs only because of worn out of brake shoe and cut in liner. It consists of two sensors. One sensor is connected with the brake shoe. The other sensor is the brake liner. The signal from the two sensors is given to a microcontroller. When the brake shoe is worn out, the sensor senses signal to the microcontroller. Also, if the brake liner is cut, the sensor sends signal to the microcontroller. The microcontroller analyses the signal and operates the corresponding indicator. It nothing wrong, the vehicle will move and if any one critical, the vehicle will stop and the screen shows the indication of brake failure. Since this indicates the status of the brake, the user can identify the condition of the brake and thus limiting the chances of malfunction.

**G.VENKATA SIVA** and eta 1PG Research Scholar, Product design, Mechanical Engineering, JNTUA College of Engineering, Ananthapuramu, and Andhra Pradesh had been concluded that an Automobile Brake Failure Indicator The auxiliary braking unit is used as secondary braking unit when the primary hydraulic disc brake of the vehicle fails. The secondary brakes receive power from battery. 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.

**Vishal Pagar** and eta Automatic Brake Fluid Leakage Prevention with Safety Bypass Braking System-2018 Automatic break failure indicator and auxiliary braking system is consisting of pressure differential sensor circuit, control unit and frame. The sensor is used to detect the brake fluid line, the control signal to the braking valve unit.

## 5.METHOLOGY

A brake is a mechanical device that inhibits motion by slowing down a body or by slowing it. Brakes retard the motion of a body creating friction between two working surfaces and convert the kinetic energy of the moving body into heat.

Sometimes brake failure may occur when the brake lining is cut-off. Most brakes commonly use friction between two surfaces pressed together to convert the kinetic energy of the moving object into heat, though other methods of energy conversion may be employed.

## Causes of Brake Failure

i. Owner Neglect

ii. Overheating Brake Pads

iii. Damaged Rotor Discs

iv. Leaking Hydraulic Fluid

v. Driving Through Mud or Water

vi. Loss of Hydraulic Brake Fluid Pressure

vii. Overloading Your Automobile

### Types of Brakes used in Automobiles

Depending on the vehicle, there are several types of brake systems. As an example, many modern passenger cars use an antilock braking system, whereas semi-trucks and trailers may require an air braking system.

**Disc Brakes:** A friction system which basically uses a wheel brake to slow down or to stop the rotation of the automobile's wheels; brake pads are pressed against the brake's rotor with a set of calipers.

**Drum Brakes:** A friction system using a set of brake shoes or pads to press against a brake drum of the wheels of the vehicle. A Drum brake is a brake that uses friction caused by a set of shoes or pads that press outward against a rotating cylinder-shaped part called a brake drum. The term drum brake usually means a brake in which shoes press on the inner surface of the drum.

**Single-Circuit Hydraulic Brakes:** A master or primary cylinder fed by a reservoir of hydraulic brake fluid and connected by a system made up of metal pipes and rubber fittings attached to wheel cylinders; each wheel is having an opposing pistons on band or drum brake; pressure is produced to push pistons apart and force brake pads into wheel cylinder.

**Dual-Circuit Hydraulic Brakes:** consists of a command circuit which is activates when the brakes are pressed and a second circuit controlled by the vehicle's computer that calculates applied force and applies it to the hydraulic pump system.

**Brake-by-wire:** A system consisted of electronic wires that, when brake pedal is pressed or pushed, measures electrical resistance and sends the signals to the car's computer, which here calculates the applied force and applies it to the hydraulic pump system.

**Antilock Braking System (ABS):** An electrical control unit, hydraulic actuator and individual wheel speed sensors that work together to prevent the brakes from locking up when they are "slammed on" by rapidly pumping brakes when a potential lockup is detected by the system, each wheel is controlled individually to maintain traction between the wheels and the road.

**Power Brake Booster:** A system utilizing the vacuum power which is been produced in an engine naturally to amplify the pressure applied by the driver's foot to stop even very heavy vehicles. Air Brakes: A system using air instead of using the hydraulic fluid to slam a standard disc or drum brake, it is usually used in buses, trucks, trailer and other heavy vehicles.

**Advanced Emergency Braking System (AEBS**): An autonomous safety system that uses the sensors to monitor a vehicle's proximity to others in the area near or surrounding and automatically applies emergency braking mechanisms to avoid collision about to happen.

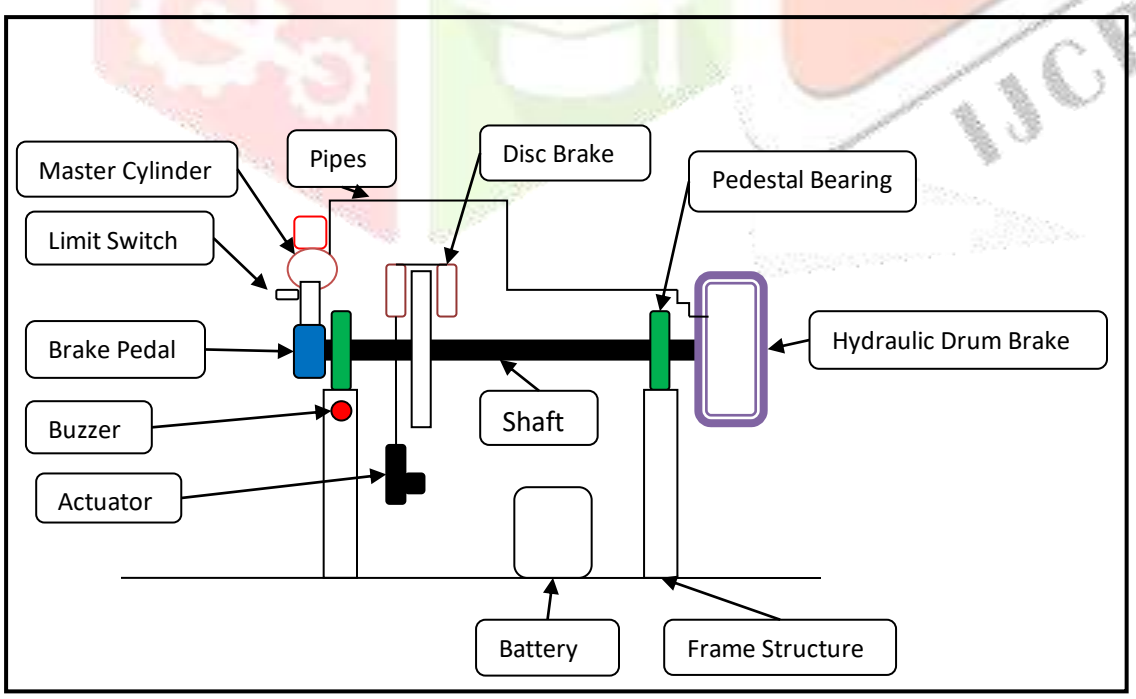
**Parking Brakes:** A parking brake allows for a vehicle to stay in the same place when parked on an incline or flat surface, and prevents free rolling of the vehicle when it is not in operation. The parking brake is usually operated by a small pedal near the driver's side door below the steering column, or by a lever in the center console, either requiring mechanical force to operate. Some latest vehicles have replaced these devices with a simple button which is been controlled by the electronic system or the computer of the vehicle. The

mechanism uses a simple latching system with a cable that directly connects the brakes to the brake pedal or lever inside the vehicle, which in turn uses a ratchet-locking device. Usually, the cable used in a parking brake will bypass the service braking system to ensure the vehicle is able to stop in the event of service brake failure.

**Emergency Brakes:** The emergency brakes are as same as that of parking brakes, so the mechanisms used to control are the same for both the brakes. The difference in both the terms is situational, and the way the vehicle responds when using the parking brake as an emergency brake can be completely different than the use of service brakes. When the parking/emergency brake is applied by the driver, the cable connecting the device and the brake system passes to an intermediate lever, which causes the force to increase while passing through a part called an equalizer. The equalizer then splits the cable in two, and divides the force between the rear wheels equally to slow the automobile. Because the emergency brakes are only applied to the rear wheels, when they are used when a vehicle is in motion, it is likely that the brake balance of the car may be upset, which can result to loss of control. It is also possible that the force applied by the emergency brake may not be enough or sufficient to stop the vehicle. Emergency brakes are meant for use in cases of service brake failure as a means of backup.

**Block Diagram**

This model is usually used to describe an object oriented programming approach. ... Collaboration: Using this element, you would describe the interaction between various elements.



**Advantages**

i. No need of external battery. Circuit can be powered from the vehicle's battery itself.

ii. Power consumption is comparably less.

iii. It is not depend on the petrol level.

iv. Operating principle is very easy.

v. The safety of driver is ensured.

vi. Brake failure is notified to the surrounding traffic via buzzer.

vii. The cost is low.

**Disadvantages**

i. Initial cost is high.

ii. Maintenance is high.

iii. Difficult to find spare parts.

**Applications**

i. Four wheeler application
ii. Two wheeler application
iii. Mechanical Crane
iv. Mechanical machines

## Conclusion:

The main purpose of this project is to provide such a device to vehicles operator so that any harmful damage and accidents cause by failure of brake switch can be easily prevented by the proper indication of working condition of brake switch. There are many aims of this project describe as:-

1. To indicate the proper working condition of brake switch
2. To prevent small number of accident occurs in trains and boats by the failure of brake switch
3. To gives the audio visual indication when there is a mistake in braking system.

## References:


1) Preetam Adhav, Kamlesh Khomane, Mohit Lohakare and Vaibhav Koltake, "Brake Failure Indication and auxiliary braking system", Journal of Emerging Technologies and Innovative Research, Volume 9, Issue 8, 2022, Pp-78-81
2) Avirat Kshar, "Automatic Brake Failure Detection with Auxiliary Braking System", International Journal of Innovative Research in Technology, Volume 4, Issue 12, 2018, Pp-236-240
3) Prof. Pandit Biradar, Jitendra Baravkar, Komal Bhujbal and Avi Bhapkar, "Automatic Brake Failure Detection with Auxilary Braking System", Volume 2, Issue 3, 2016, Pp-1-5
4) K.V. Pradeep, Ramaprakash. G. Gopi, and Sheshi Kumar, "Automatic Brake Failure Indicator", International Journal of Research in Engineering, Technology and Science, Volume 13, Issue 8, November.2020, Pp-1-5
5) K. Mohan and G.Pugazhendhi, "Accidents Avoiding System Indicator Due to Brake Failure", Asian Journal of Applied Science and Technology, Volume 1, Issue 6, 2017, Pp- 03-07
6) B. Nimal Karthik and Santhanakrishnan, "Detection of Brake Failure by Automatic Indicator Using Sensors and Microcontroller" International Journal of Scientific & Engineering Research Volume 11, Issue 1, 2020,Pp-808-812
7) Dhanamjayulu C, Chalamalasetti Guna Sai, Bharath Srinivas G., Hussain Basha D., Arunkumar G. and Venugopal P. "Brake Failure Detection and Emergency Braking System", International Journal of Innovative Technology and Exploring Engineering, Volume-9, Issue-2, December 2019, Pp 257-301
8) Radhakishan Maske, Satesh Surwase, Balbhim Moharir, Vrushabh Mahajan,Vijay Kedar and Prof. Amol Adkine., "Automatic brake failure Indicator and braking system", IJARIIEVol-3 Issue-3 2017, Pp-2168-2172
9) Lijin Joseph, Giridharan.S. and Gokulkumar G. "Identification of Brake Failure by Using IR Sensor",International Journal of Engineering Science and Computing,Volume 6, Issue No. 3, 2016, Pp-2448-2450
10) Anant W. Nemade, Samir A. Telang and Dr. Arvind L. Chel, "Vehicle Brake Failure and Road Accidents- An Investigation", International Journal of Engineering Technology Science and Research, Volume 5, Issue 3, 2018, Pp-1009-1014
11) Radhakishan Maske and eta "Automatic brake failure indicator and braking system" in International Journal of Advance Research and Innovative Ideas in EducationVol-3 Issue-3 2017
12) Pandit Biradar and eta "Automatic Brake Failure Detection with Auxiliary Braking System" in International Journal for Science and Advance Research in Technology Volume 2 Issue 3 –MARCH 2016
13) K.Mohan, G.Pugazhendhi "Accidents Avoiding System Indicator Due To Brake Failure" in Asian Journal of Applied Science and Technology, Volume 1, Issue 6, Pages 03-07, July 2017