International Journal of Scientific Research in Engineering and Management (IJSREM)
Volume: 05 Issue: 05 | May - 2021 ISSN: 2582-3930

A Review on Automatic Brake Failure Detection with Auxiliary Braking System

Akshay Gaikwad[1], Prof. J.Bute[2.]

[1](Student(Mechanical Engineering)/Pimpri Chinchwad College Of Engineering & Research,Pune,India)

[2](Asst.prof./Pimpri Chinchwad College Of Engineering & Research,Pune,India)

Abstract:The Road accidents are common nowadays. According to National Highway Traffic Administration, car accidents happens every 60 second. The accidents might occur because of various reasons like loss of control of driver from vehicle, overtaking vehicles, due to rush driving, but the main reason behind the accidents is improper working of brakes or brakes failure. The driver which is driving the vehicle has no idea about vehicle brakes and while driving when he tries to apply brake then he comes to know about brake failure but it's too late and this leads to accidents and human loss. The idea of this project is detection of brakes failure and providing auxiliary braking system in vehicle so in case if primary braking system fails then driver can stop the vehicle by using secondary braking system.

The entire system is developed by taking into consideration following factors like consideration of human tendency, minimum efforts and the efficient use of entire braking system. The system has the least components so that it will the least amount of space to accommodate in vehicle. The buzzer is provided in this system to give indication to driver in form of sound. The Auxiliary Braking system also stars its working with the help of microcontroller unit to apply secondary brakes. This system is highly cost effective and efficient for automobile industry.

Keywords:Accidents, Brake, Safety System, Auxiliary system.

Introduction

The human life is one of the most precious thing. Mostly the loss of human life occurs due to accidents which happens every time, everyday across the world. The main reasons for accidents are overtaking vehicles, rush driving, driving of vehicle from wrong direction, not using of side indicators while taking turn, drink and drive, taking sudden turns before seeing mirror while turning, the blows out of tire etc. The Brake is an important component of vehicle. Brake is a mechanical device which bring moving body to rest or slow down it speed.

Today the brake failure occurs due to reasons like poor maintenance, product defects, loss in brake hydraulic fluid pressure, overheated brake pads, damaged rotor Disc etc. The loss in brake system pressure causes pressure loss in system due to which when driver applies brake there is less or no braking effect which leads to accidents and human loss. So our aim in this project is to provide an auxiliary braking system which acts as secondary braking system so that when primary braking system fails due to any reason then secondary braking system can be used by driver to stop the vehicle.

The system consist of Pneumatic braking unit and microcontroller unit. In this two braking system Disc and Drum is used. When primary brakes failure to this solenoid valve is activated which allows compressed air from reservoir to flow through piston cylinder arrangement. This piston pushes secondary lever to get attached with primary lever. This leads the secondary braking system to get actuated and braking is done. This system provides an overall safety to vehicle and it's driver this ensuring proper operation of braking system.

Literature review

The braking system is most important component of vehicle which ensures the safety of vehicle and it's driver. The main reasons behind the accidents are insufficient braking force applied hence the stopping distance of vehicle increases while leads to accidents. The work of this model begins with the method of detection of issues by considering the reaction time of driver and the capability of driver to apply suddenly brakes during emergency situation and also detection of failure of primary brakes so that secondary brakes can get activated and can be brought into action in the shortest possible time. The shortest time to engage auxiliary brake after primary brakes failure were taken into consideration through sensing element.

In this project primary braking system is made already failed so that the operation of secondary braking system can be shown. As brakes are failed due to any reason like improper maintenance, leakage in braking fluid etc. When drives tries to apply brake as primary braking is failed so there is no braking but in this situation driver presses the brake pedal 3-4 times due to which the role switch gets actuated and send signal to microcontroller unit. The microcontroller starts beeping and blows LED signal for driver and further this signal is sent to solenoid valve. The solenoid function is to control inlet compressed air and the other end is connected to piston cylinder arrangement. The piston cylinder arrangement engages secondary lever with primary lever by means of dial pin which is attached in primary braking pedal. The shooting keeps the compressive force maintained so both levers are engaged with each other for successful braking application. The entire braking system can work in just 3-4 seconds. This method is fast, safe and reliable for operation. This system provides safety and instant braking application.

Figure.[1]

List Of Components

1. Wheel: Wheels are a circular object that revolves on an axle and is fixed below a vehicle. The shaft is supported on pedestal type of bearing on each side. The wheel is one of the major key component of a wheel and an axle carrying the primary disc assembly and the secondary drum assembly.

Figure.[2]

2. Pneumatic Cylinder: A double acting cylinder is used in which the working fluid acts on both the sides of the piston. In order to actuated the secondary lever, the cylinder piston arrangement can be effectively used.

Figure.[3]

3. Solenoid Valve: A solenoid valve is a valve which is electromechanically operated. It differs in the characteristics of electric current they use, the strength of magnetic field generated, the mechanism used to regulate fluid flow. The electric current controls the solenoid valve. The compressed air from reservoir flows through solenoid valve as it receives the signal from microcontroller unit and thus piston cylinder arrangement engages secondary lever with primary one.

Figure.[4]

4. Limit Switch: A limit switch is an electromechanical device which are operated by a physical force applied to it by an object. It consists of an actuator which is mechanically linked to a set of contacts. When any object's come in contact with actuator, the switch will operate causing an electrical connection to make or break between the microcontroller unit and mechanical system. Here the limit switch is mounted on wooden plate whose one end connected to microcontroller unit and the other end is actuated by operating brake pedal. If primary brakes failure occurs then secondary brakes can be actuated by roller switch by just pressing the secondary lever for 3-4 times.

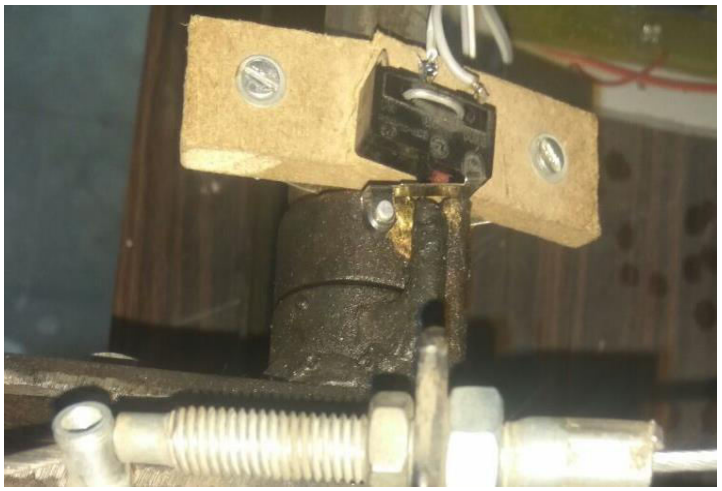

Figure.[5]

5. Microcontroller Unit Plate: The microcontroller units are compact in size and it helps in reducing cost by comparing the design that uses a separate microprocessor, memory and input/output devices. The various components used on microcontroller plate are Transformer, Capacitor, Transistor, Oscillator, Inductor, LED Bulb, Relay, Resistors.

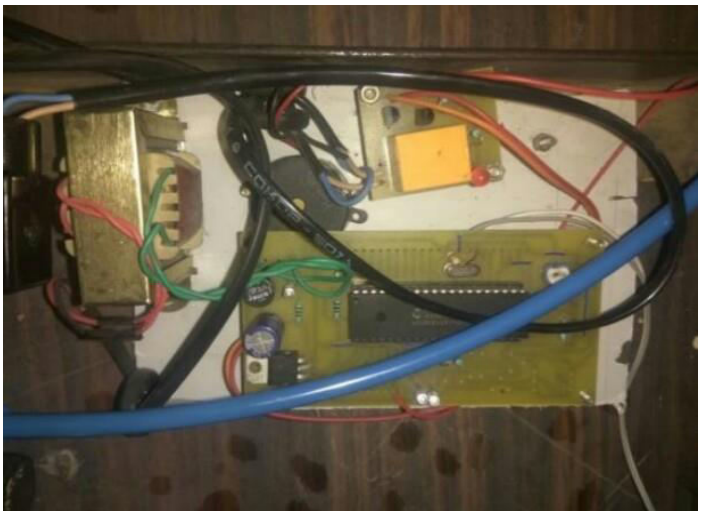

Figure.[6]

6. Voltage Regulator: Voltage regulator is an electronic device that maintains the voltage of a power source within acceptable limits. The voltage regulator is required to keep voltage in prescribed range that can be tolerated by electrical equipment using that voltage.

Future Scope

1) The actuating mechanism for secondary braking system can be achieved by various means like using cam and follower arrangement, Magnetic arrangement etc.
2) The means of actuation of secondary braking system can be changed from pneumatic to any energy transmitted fluid.
3) Sensor monitor can be used instead of using two levers.
4) A single lever may serve the purpose.

Conclusion

This method can be used for increasing the efficiency of braking system. This project helps to reduce the chances of accidents due to brake failure and can save the life of human beings. The Auxiliary Braking system is also provided in system also increases the safety of driver. Brake failure Indication system is an early warning system. The system continuously monitors the condition of brakes and the buzzer provided in the system gives visual signal to driver then brakes failure occurs. The system is useful for prevention of accidents and saving of human life.

Acknowledgment

We would like to thank to all the authors of all different research papers referred during the making of this paper. It was very helpful, knowledge gaining for our study and for doing further research in the future.

References

[1]. Avirat Kshar, Veermata Jijabai Technological Institute (VJTI), Mumbai, "Automatic Brake failure Detection with Auxiliary Braking System", May 2018|IJIRT| Volume 4 Issue 12| ISSN: 2349-6002.

[2]. Prof.Pandit Biradar, Jitendra Baravkar, Komal Bhujbal, Avi Bhapkar Department of Mechanical Engineering MECOE,Pune,Maharshtra, India "Automatic Brake Failure Detection with Auxiliary Braking System", 3 March 2016| Volume 2 Issue 3|ISSN:2395-1052.

[3]. B.Nimal Karthik, Santhanakrishnan, Dept. of Mechanical Engineering, SRM University, Katrankulathur "Detection of Brakes Failure By Automatic Indicator Using Sensor And Microcontroller",1 January 2020 |Volume 11 Issue 1|ISN:2229-5519.

[4]. Radhakishan Maske, Satesh Surwase, Balbhim Moharir, Vrushabh Mahajan, Vijay Kedar, Prof. Amol Adkine, U.G. Students, Department of Mechanical Engineering, S.Y.C.E.T, Aurangabad, Maharashtra, India "Automatic Brake Failure Indicator And Braking System| Vol-3 Issue-3 2017| IJARIE-ISSN(O)-2395-4396.