

Analysis of Developing Mechatronic System Based Dual Braking System in Automobiles

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Abstract – Braking system is most important in automobiles. When brakes applied in cars five most problems are car pulls to one side, steering wheel shakes, and brake pedal pulses up and down, whole car shakes. To eliminate these problems, in this paper I discussed analysis for developing Mechatronic system based dual braking system. The Brake is operated manually. Hand operated Brake and pedal brake is integrated; it can eliminate the above mentioned problems up to controllable limits. Those integration possibilities are in between brake pedal and master cylinder. The paper comprises of detail about analysis of Mechatronic system based Dual Braking System (MSBDBS) with various applications and increasing safety in automobile vehicles.

Keywords – *Automotive, Braking System, Integrated, Mechatronics, Master cylinder.*

1. INTRODUCTION

The most important part in the automobile is the braking system [1]. This may lead to rolling of vehicle in case of slopes and collision with other vehicles in parking area. Without operation of safety brake cable, the brake will not work. The safety braking system is integrated with help of the cable, that cable is connected to pedal brake. Whenever driver applies brake with hand the force is applied in the master cylinder then brake will work. In this system with help of the navigation system we can eliminate these problems. The navigation system will provide indication to the driver if braking system fails and during working condition, automatically lock the braking system. In this type of system driver will concentrate for applying brake in both ways using hand and pedal due to this we can eliminate the accidents.

2. BRAKING SYSTEM

The brakes may be disc type or drum type. The front brakes play a greater part in stopping the car than the rear ones, because braking throws the car weight forward on to the front wheels. Many cars therefore have disc brakes, which are generally more efficient, at the front and drum brakes at the rear. A hydraulic brake circuit has fluid-filled master and slave cylinders connected by pipes. The master cylinder transmits hydraulic pressure to the slave cylinder when the pedal is pressed. When driver applies force on brake pedal it depresses a piston in the master cylinder, forcing fluid along the pipe. Fluid pressure distributes itself evenly around the system.

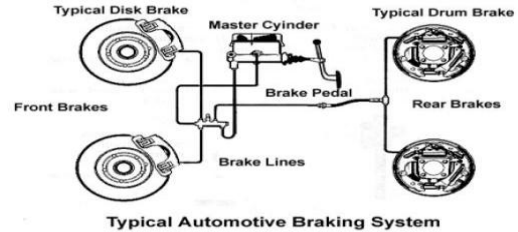


Fig 1. Braking System

If gentle half before seeking service assistance The most common use for an automobile emergency brake is to keep the vehicle motionless when it is parked, thus the alternative name, parking brake. Car emergency brake has a ratchet locking mechanism that will keep them engaged until a release button is pressed. On vehicles with automatic transmission, this is usually used in concern with parking pawl in the transmission.

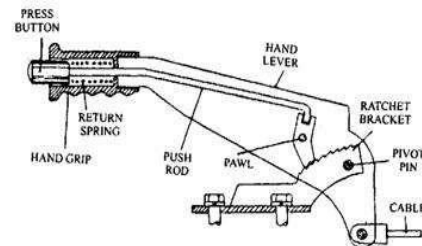


Fig 2. Brake Handle

4. ANALYSIS OF HAND OPERATED SAFETY BRAKING SYSTEM

In this system the Brake and typical braking system are integrated to one master cylinder. This master cylinder to transmit hydraulic pressure to the slave cylinder whenever the brake pedal pressed and simultaneously we able to operate safety brake also. In this Brake cable is connected to the master cylinder. The Brake cable also gives same force like pedal force in typical hydraulic braking system [3]. In this system the typical automotive braking system and hand operated Brake is integrated as one system and applies brakes to both ways like through pedal and hand. The Brake engagement and disengagement is done with the help of typical braking system. With help of this system we can develop braking navigation system, and apply brakes [4] comfortably and gives most accurate brake force during braking. In this block diagram indicates the idea of design and analysis of mechatronic system based braking system.

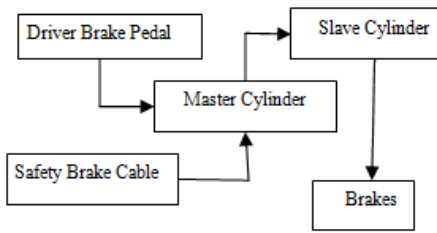


Fig 3. Block Diagram

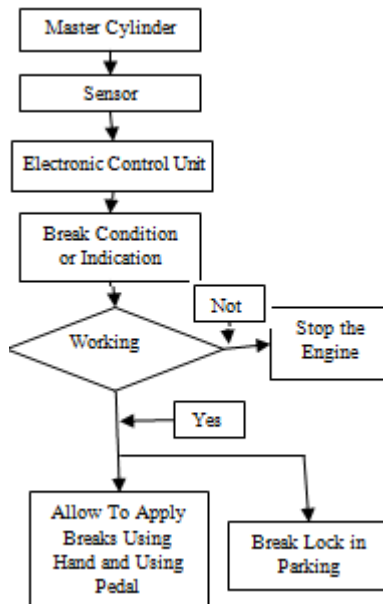


Fig 4. Flow Diagram

5. HAND OPERATED SAFETY BRAKING SYSTEM ALGORITHM

Stage 1: Start

Stage 2: The integration of brake pedal and hand operated brake mechanical design has direct norms with the system design hence system is designed such that distinctions and dimensions thus obtained in mechanical design can be well fitted in to it.

Stage 3: Design of driver pedal and Brake cable integrated link. This link should be fitted to the master cylinder and should connect to the electronic control unit.

Stage 4: Slave cylinder design should be according to the master cylinder.

Stage 5: Design of links between slave cylinders to the brakes.

Stage 6: If brakes are not working go to step 2 to step 5.

Stage 7: Stop.

6. NAVIGATION SYSTEM

The navigation consists of an electronic control unit (ECU). The master cylinder, brake pedal and Brake cable integrated design is connected to the ECU. With help this unit we can display the brake condition and

can lock whenever vehicle in parking. The navigation system flow chart as shown in fig.4.

7. APPLICATIONS, RESULTS AND DISCUSSIONS

In all 4 wheelers as well as in heavy vehicles if this system is installed it will be very useful. It is beneficial for operator's safety by reducing accident chances as well as disengaging chances of braking. This braking system will help to apply brakes in cars during up hills and also this system can be used in heavy vehicles to keep the vehicle stationary. The working is quite simple and doesn't require any extra effort to operator or driver. There is no possibility of risk because by locking the doors, the Brake system is automatically gets locked.

9. CONCLUSTIONS

In this paper I explained analysis to develop Mechatronics system based Dual Braking System mechanism. In this I explained flow chart for navigation system and proposed hand operated safety braking system. After integration of this system in automobiles it can control accidents, vehicle rolling up to controllable limits.

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