

Smart Handbrake System With Integrated Seat Belt Safety And Downhill Locker

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ABSTRACT

Conventionally the hand brake is used as the parking brake which is applied when the vehicle engine power is cut down and the vehicle is to be parked or stand still. Very often accidents are seen to happen when the driver forgets to apply the handbrake on a vehicle on slight gradient or slope.

Project takes into account several safety issues and permutations with the hand brake which are listed below as problem statements. The objective of the project is to develop a smart handbrake system that will resolve all safety issue and also assist the driver while climbing steep slopes in dense traffic. Project work will include the brake effort calculation for given condition of operation, design of all components using theoretical method for strength, 3-D modeling of components and assembly using Catia. The fabrication of the unit will be done using suitable process and test will be carried out on the unit to prove that the above said four features work in the model

Keyword : - Smart Handbrake System, Seat Belt Safety, Downhill Locker, Handbrake, Integrated Seat Belt Safety.

Introduction

In normal vehicles a hand brake is consist of a cable connected to two wheel brakes at one end and the other end to a pulling mechanism which is operated by human with hands. In this case human effort is required to pull the mechanism and apply the brakes. To minimize this human effort is the main aim of our project with help of hydraulic system is important to disengage the handbrake before starting the vehicle from rest position. Due to operator errors the conventional handbrake system remained engaged even when the vehicle was moving due to manual operation of the hand lever through which the handbrake is operated. This led the brakes to become ineffective and eventually they failed to serve their purpose.

The main functions of brakes system are to decelerate the vehicle, to maintain the vehicle's speed during downhill operation and finally to park the vehicle stationary either on a flat or slope road condition. In normal vehicles a hand brake is consist of a cable connected to two wheel brakes at one end and the other end to a pulling mechanism which is operated by human with hands. In this case human effort is required to pull the mechanism and apply the brakes. To minimize this human effort is the main aim of our project with help of hydraulic system .In some cases people are forget to apply hand brakes while parking the vehicle which results in moving the vehicle and causes accidents. To avoid this we develop such system in which hand brakes are control with ignition system of vehicle. Means a hand brake mechanism and ignition system of vehicle is connected each other with simple hydraulic system for applying the

hand brake while parking.

One of the most important safety features in an automobile is brake. A typical automobile consists of two types of brakes, one for retarding the speed of vehicle while it is in motion and other is to hold the vehicle in its place when standing still or parked. The latter is mostly important when the vehicle is parked on slope. It is important to disengage the handbrake before starting the vehicle from rest position. Due to operator errors the conventional handbrake system remained engaged even when the vehicle was moving due to manual operation of the hand lever through which the handbrake is operated. This led the brakes to become ineffective and eventually they failed to serve their purpose. To overcome all the limitation of the conventional system we proposed the new automatic handbrake engagement and release system Conventionally the hand brake is used as the parking brake which is applied when the vehicle engine power is cut down and the vehicle is to be parked or stand still. Very often accidents are seen to happen when the driver forgets to apply the handbrake on a vehicle on slight gradient or slope.

Project takes into account several safety issues and permutations with the hand brake which are listed below as problem statements. The objective of the project is to develop a smart handbrake system that will resolve all safety issue and also assist the driver while climbing steep slopes in dense traffic. Project work will include the brake effort calculation for given condition of operation, design of all components using theoretical method for strength, 3-D modeling of components and assembly using catia. The fabrication of the unit will be done using suitable process and test will be carried out on the unit to prove that the above said four features work in the model.

PROBLEM STATEMENT

Very often accidents are seen to happen when the driver forgets to apply the handbrake on a vehicle on slight gradient or slope so that to overcome this problem we develop and design automatic operation of the handbrake with integrated seat belt safety.

OBJECTIVE OF THE PROJECT

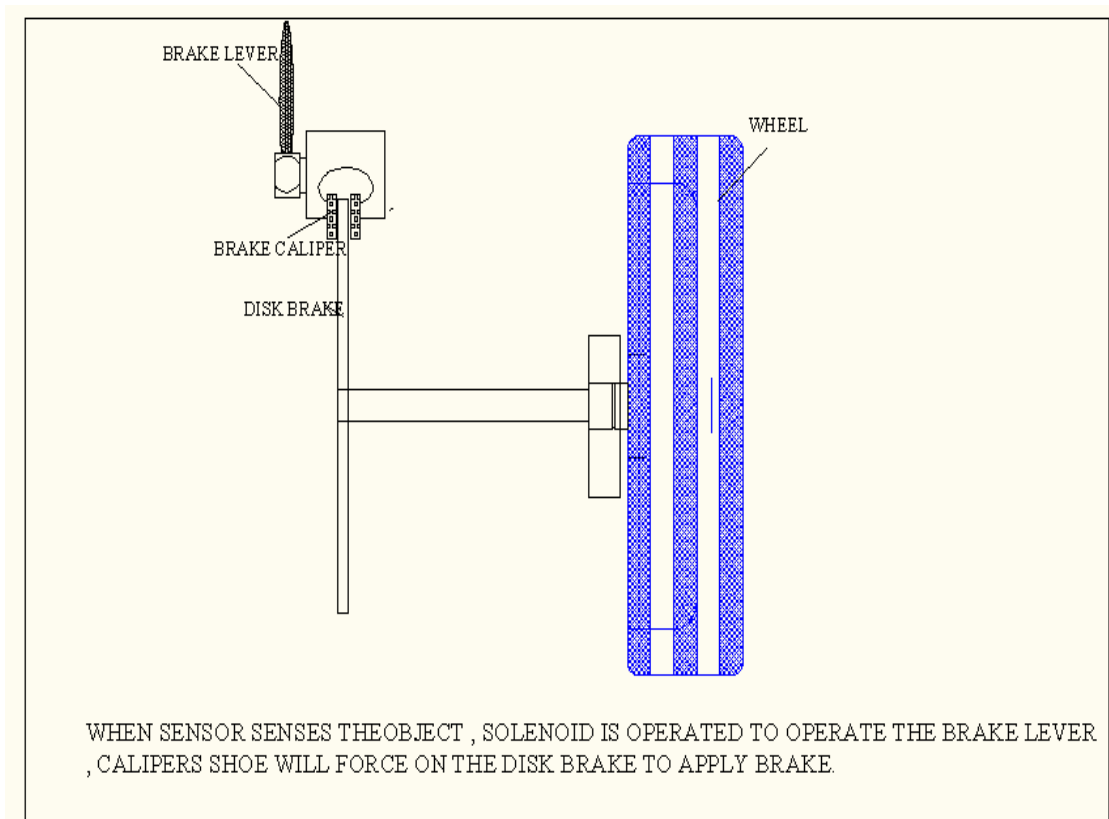
The objectives of project are as follows:

1. Development and testing of automatic handbrake release system with integrated seat belt safety lock
2. Development and analysis of the automatic handbrake release mechanism when seat belt is worn and vehicle is in motion.
3. Development analysis of automatic downhill locker mechanism sensing reverse motion.

SCOPE

1. It can be used automate overall braking system in an automobile.
2. It can be developed to use in case of failure of main Braking System of the vehicle. That is if the foot brake fails this system may take over to retard the vehicle to safe speed and ultimately stopping it.
3. It can be developed to operate these brakes remotely using a remote key or a Smartphone
4. This system can be useful in driverless cars.

WORKING OF DISK BRAKE



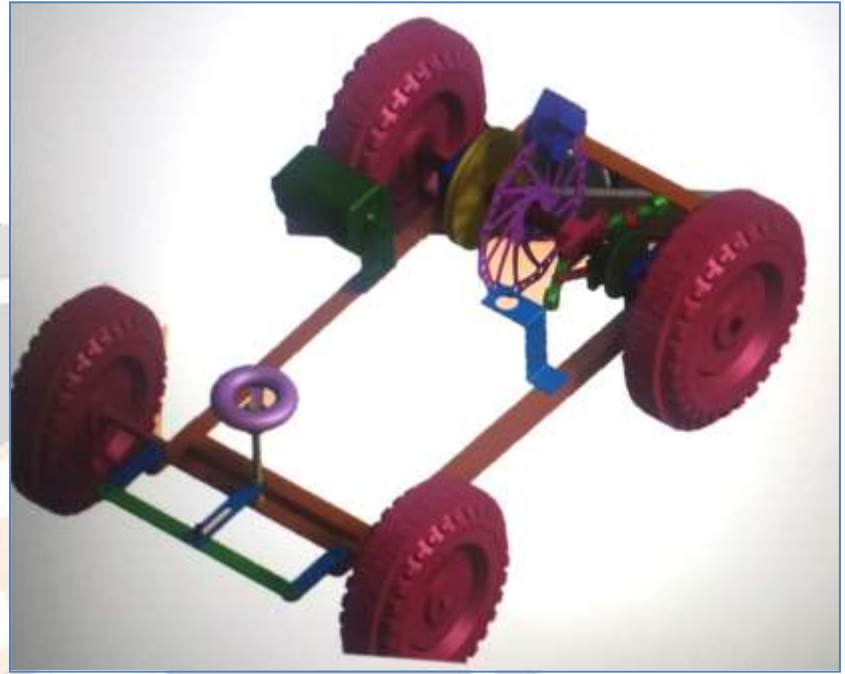
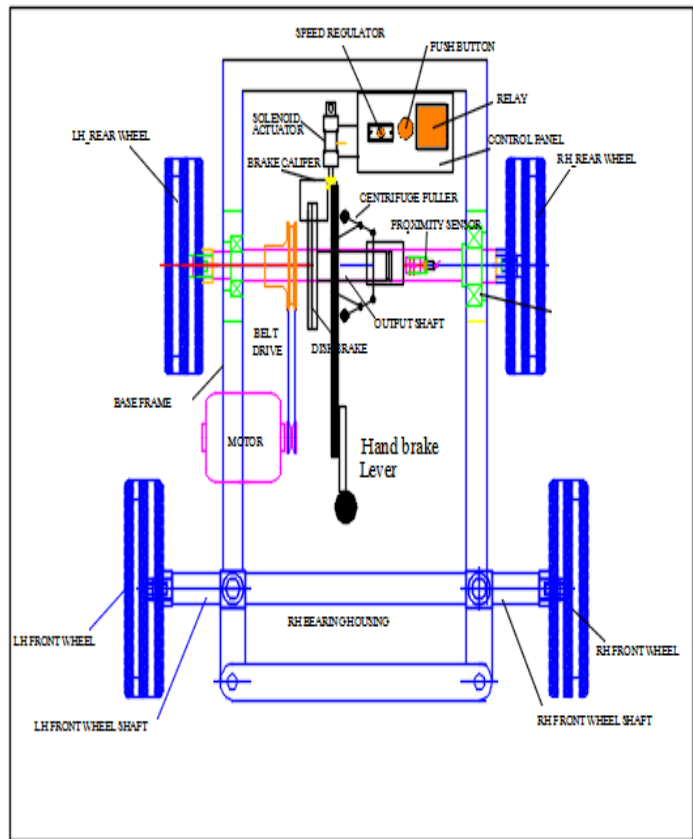
Working Of Disk Brake

Note : the disk brake is mounted directly on the rear axle.....for model purpose

The smart hand brake is fitted with a small mechanically governed speed sensor mechanism which sense the vehicle speed and thus will automatically bring the handbrake into action as soon as the vehicle comes to halt thus the handbrake is automatically operated without even the drivers intervention thereby preventing any accident if the vehicle rolls forward or backward on its own. The smart hand brake system speed sensor system is used for automatic release , such that when the driver put the vehicle in transmission the speed sensor sensor system senses motion and automatically releases the hand brake thereby avoid any un necessary brake wear and tear and also reduce the fuel consumption and drop in mileage of vehicle due to handbrake applied driving condition although an safety interlock is provided such that if the driver does not put the seat belt hand brake will not be automatically released till he puts on the seat belt. Safety interlock for seat belt is provided such that the automatic handbrake release mechanism only works if the seat belt is put on but the real time hand brake will only be done when the driver puts the vehicle in transmission because releasing handbrake as soon as seat belt is put on may again lead to vehicle rolls forward or backward on its own if vehicle is on a slope. Down hill locker facility is an new innovation where in the hand brake is applied as soon as the vehicle reverse motion is sensed except in the reverse gear this will prevent any accident if vehicle accidently goes into neutral or engine stops, the tendency of the vehicle is roll backwards here the downhill locker will apply the handbrake automatically. Manual interface is provided for hand brake such that it can be applied manually if the driver desires in case of emergency

EXPERIMENTAL SETUP AND CAD MODEL –

SMART HANDBRAKE SYSTEM WITH INTEGRATED SEAT BELT SAFETY AND DOWNHILL LOCKER

**CONCLUSION:**

To develop a model of smart handbrake system with integrated seat belt safety and downhill locker using governor, proximity switch relay. The upward and downward motion of governor sleeve due to centrifugal force acting on it as governor connected to rotating rear axis is used to operate proximity switch which gives signal to relay and braking system.

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