

Fabrication of Automatic Handbrake System

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Abstract— 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. Sometimes due to negligence or in emergency conditions, we humans often forget to apply parking brakes. This may lead to rolling of vehicle in case of slopes and collision with other vehicles in parking area. Sometimes if service brake fails parking brakes are used as a emergency brake to stop the vehicle. This Project provides a new concept design of the parking brake system that has simple and low-cost characteristics. This system uses electrically operated components using solenoid circuits. This system operates depending on the positions of the key. When the ignition switch is turned on the handbrake disengages and engages when the ignition is turned off.

Keywords: Automatic Handbrake, Handbrake, Vehicle Safety

I. INTRODUCTION

In cars the hand brake is a latching brake usually used to keep the car stationary. Automobiles e-brakes usually consist of a cable directly connected to a brake mechanism on one end and to some type of mechanism that can be actuated by the driver on the other end the mechanisms is often a hand-operated lever, on the floor on either side of the driver, a pull handle located below and near the steering wheel column, or a pedal located far apart from the other pedals. Although sometimes known as an emergency brake using it in any emergency where the footbrake is still operational is likely to badly upset the brake balance of the car and increase the likelihood of loss of control of a vehicle for example by initiating the rear-wheel skid. Additionally, the stopping force provided using the hand brake or in addition to the footbrake is usually small and would not significantly aid in stopping the vehicle, again because it usually operates on rear wheel while braking. The emergency brake is instead intended for use in case of mechanical failure, where the regular footbrake is inoperable or compromised, hopefully with opportunity to apply the brake in a controlled manner to bring the vehicle to a safe. Brakes are one of the most important safety systems in a motor vehicle. 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. The first two functions are related to the service brakes, while the last function is referred to the secondary or parking brakes. Conventional parking brake actuation involves the human interference. Without pulling or pushing the lever, the parking brake will not work. Also, sometimes

due to negligence or in emergency conditions, we humans often forget to apply parking brakes. This may lead to rolling of vehicle in case of slopes and collision with other vehicles in parking area. Constant enhancements in active safety and improvements with respect to the reliability and comfort of operation mean that mechanical handbrakes are increasingly being replaced by new other systems and this giving birth to new ideas of parking brake techniques.

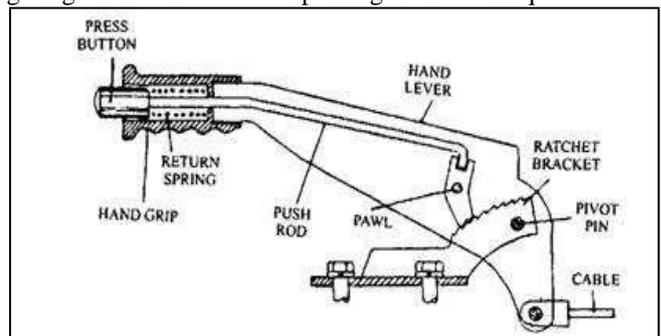


Fig. 1: Conventional handbrake system

II. WORKING PRINCIPLE OF CONVENTIONAL HAND BRAKE

A rack is toothed bar which is connects with handbrake lever, when the Hand brake lever is pushed upwards the rack is rotated on pinion which is connect to rear wheel brake and thus hand brake applied And its released or disengagement is done by spring mechanism.

III. AUTOMATIC HANDBRAKE SYSTEM

We produced an automatic handbrake system that basically work on an ignition position to engage or disengage a handbrake.

IV. COMPONENTS

A. Frame

We design a basic frame which consists of 4 angle plate made of mild steel.



Fig. 2: Frame

B. Battery

A 12V motor s required to give a output to ignition key and solenoid circuit for actuation of handbrake mechanism.



Fig. 3: Battery

C. Ignition On Off Switch

As our project s based on ignition position t s one of the main part which required to operation of automatic handbrake system



Fig. 4: Ignition ON OFF switch

D. Solenoid

Solenoid s generic term for a coil of wire used as an electromagnet. It also refers to any device that converts electric energy into mechanical energy using solenoid. n this system solenoid s connected with brake linkages so that when the current s passed through solenoid t forces brake cable to apply brake.



Fig. 5: Solenoid switch

E. Wheel with drum brake-

We use a typical wheel of motorcycle with typical drum brake to demonstrate our design.



Fig. 6: Wheel

V. WORKING PRINCIPLE

The conventional handbrake system s manually operated and uses a hand lever and cables for its operation. At the time of engagement hand lever s pulled upwards creating tension on the cable eventually creating the braking force required for locking the wheels Disengagement requires releasing of the pawl from the ratchet which s accomplished by pressing the button incorporated n hand lever. Thus the system we have designed eliminates the use of pawl and ratchet mechanism that completely makes the automatic working of handbrake. We made use of Solenoid switch and ignition on off key for operate a handbrake against a different condition. When the ignition key at OFF position the solenoid s working and engage the handbrake by pulling the brake cable, while when the ignition key s at ON position current will not flowing through solenoid and pulled cable s now released by solenoid , thus the handbrake comes to disengaged position.

VI. 3D MODEL

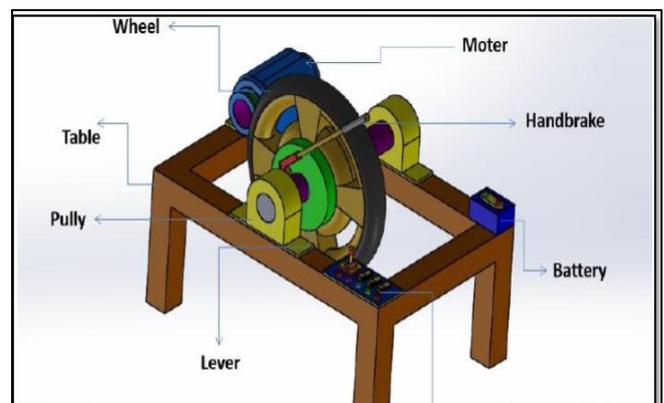


Fig. 7: 3D model

VII. CONCLUSION

Thus the use of conventional hand brake system can be eliminated using our system .There are many automatic handbrake researches are available on market with using a microcontroller and many electronics. Our system s

eliminate microcontroller which make our system so easy and so cheap to use in automobile. By implementing this system hand brake lever could be eliminated. And it also increases the comfort and safety of driver as well as passenger. Even by implementing this system front space can be increased. Braking action can be activated as well as deactivated by just pressing ON-OFF switch.

VIII. FUTURE SCOPE

- Further modification can be done by using various sensor and microcontroller in actual automobile vehicle.
- It can be used in case of failure of main brake system.
- This system can be modified to used in driverless cars.
- It applies the parking brake automatically when the ignition key is off. By using more techniques they can be further modified and developed according to required application.

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