

AUTOMATIC HAND BRAKE SYSTEM

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ABSTRACT

In today's world, mechatronics and automation are used to make system faster and safer by reducing human mistake. Many vehicles already have alarm systems that warn the driver when the vehicle comes too close to an object, but these alarms depend on the driver's response, which can sometimes cause accidents. To solve this problem, we have designed an automatic hand brake system that uses sensors to apply the brake automatically and stop the vehicle from moving backward. This system is mainly useful for heavy vehicles like trucks and buses that use pneumatic breaking systems. In this project, the hand brake is applied automatically when the ignition is switched off and released when the ignition is switched on. The main goal of this project is to develop a simple, low-cost, and reliable system using locally available components.

Keywords: Micro switch, Actuator unit, Microcontroller, Relay Module, Power Sources.

1.INTRODUCTION

The Automatic hand brake system is an advanced braking mechanism designed to improve vehicle safety and reduce the dependency on manual operation. In conventional vehicle, the hand brake is applied manually by the driver using a lever or pedal, which may somethings lead to improper braking due to human error, lack of attention, fatigue, or physical limitations. Such issues can result in rolling, accidents on slopes, and damage to property. To overcome these problems, the automatic hand brake system uses an electric motor along with mechanical components to apply and release the parking brake automatically or with minimal driver effort.

The system consists of a control unit, electromechanical actuators, and breaking mechanisms installed at the wheels, which works together to generate sufficient braking force. When activated, the control unit sends signal to the electric motor, which converts electrical energy into mechanical motion to the apply the brake through a gear or screw mechanism. The system can operate in both manual and automatic modes, making it suitable for different types of vehicles. This project focuses on designing a simple, reliable, safety, reduce driver fatigue, improve efficiency, minimize human error, and lowers maintenance costs, making it an important development in modern automotive engineering.

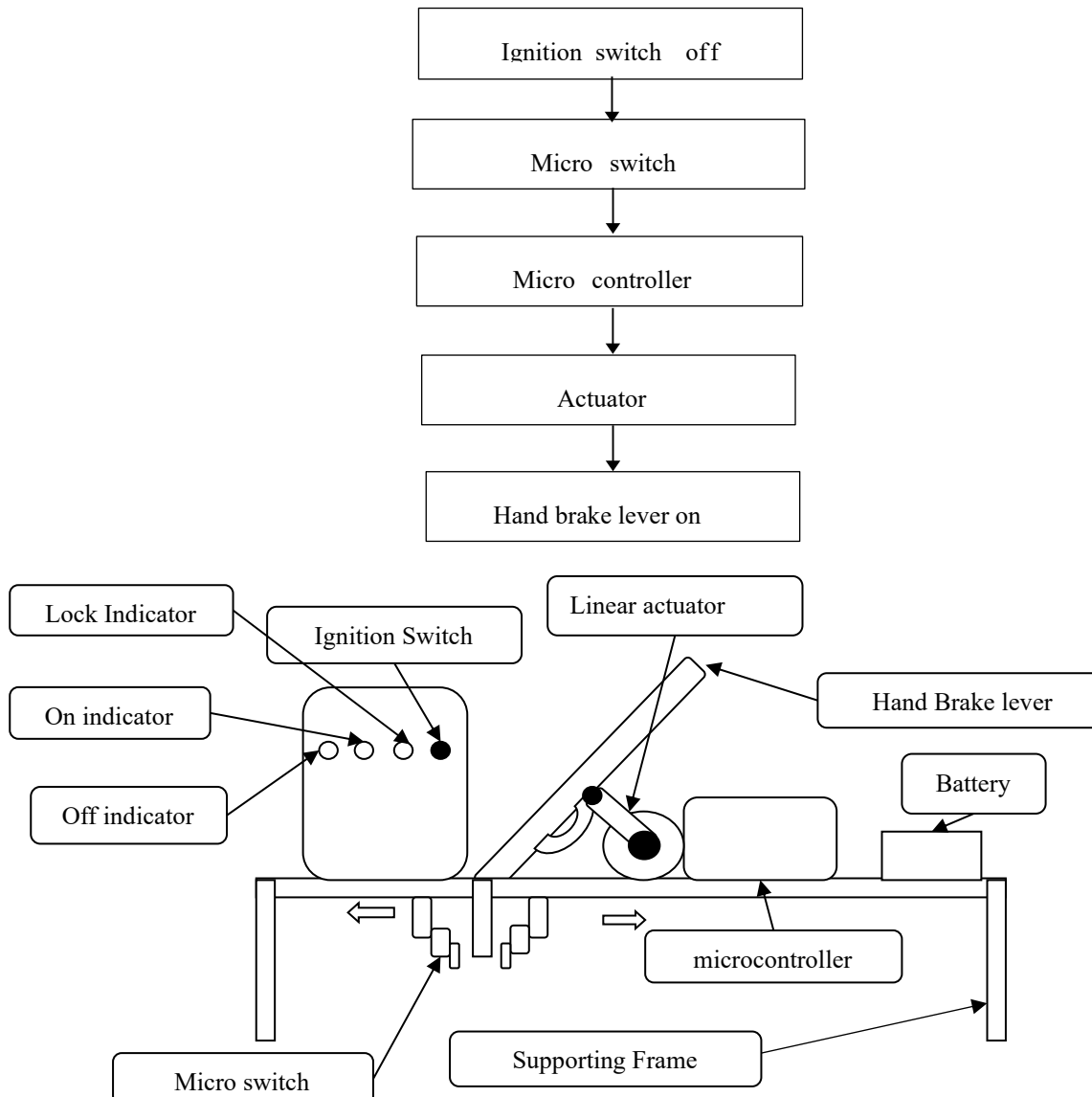
The present project is about an electric parking brake system used in motor vehicles. This system uses a control unit and two electromechanical actuators, one for each wheel, to apply the parking brake force. The electric parking brake can be activated or released using an electric motor instead of manual effort. The control unit can work in two ways: it can be use only for manual control without any automatic

function, or it can work together with another control unit to perform automatic actuation and deactivation of the parking brake. When automatic control is required, signals from sensors are sent through signal lines to control the actuators. The system is designed to be simple and cost-effective by using locally fabricated components. This project improves vehicle safety, reduces human effort and driver fatigue, increases efficiency, lowers workload, and reduces maintenance cost.

1.1 literature review

The electric parking brake (EPB) control unit can operate in manual mode by itself because it does not have its own decision- making or sensor processing function. If automatic operation is required, it must be connected to a second control unit that sends activation and deactivation signals. The system uses electromechanical actuators at each wheel to create parking brake force, which works independently of the service brake. However, since modern vehicles may include many additional brake functions (such as trailer braking), the overall system can become complex and intuitive for the driver to use.

2. METHODOLOGY AND EXPERIMENTAL SETUP



Battery

Main Power Source of the system.

Supplies 12V DC power to all electrical components.

1. Ignition Switch

Control the ON and OFF Condition of the system.

Send signal to the control unit.

2. Micro Switch

Detect Vehicle condition.

Provide safety input to the control unit.

3. Control Unit

Receives signal from ignition switch and Micro switch.

Processes the signals.

Send command to the motor.

4. Motor

Convert electrical energy into mechanical rotation.

Rotates in forward and Reverse direction.

5. Crank Mechanism

Convert rotary motion into linear motion.

Pulls or releases the brake cable.

6. Brake Lever

Applies or release the hand brake.

Control braking action of rear wheel.

7. Supporting Frame

Holds all components firmly

Provides stability and proper alignment.



Working

Working of developed a model which is automatic retardation for four wheeler when lock the ignition switch also automatically hand boscage switch in retarding condition and the releasing when ON the ignition switch. Generally speaking, it's an object of the present invention to give for simple and intuitive control of a vehicle boscage system. This is attainable by means of an actuating device of the general type under consideration, which can be switched into a farther switching state, and by means of an actuation system, where in response to an actuation, the actuating device is switched into the farther switching state. The actuating device be switched into the first switching state, the alternate switching state and the farther switching state by the same control element

By the farther switching state, it's possible, for illustration, for a caravan testing function and/ or a caravan retardation function and/ or an anti-jackknife Ng retardation function to be named by one and the same control element, or a function that prevents an automatic engagement of the parking boscage upon the deactivation of an ignition can be named by means of the actuating device, in particular by one and the same control rudiments, at least one electronic system or furnishing switching countries. The actuating device may still also have farther factors of the boscage system, in particular control electronic, power electronics and boscage selectors.

The Control element of the actuating device according to images of the invention can be controlled intimately and more fluently also the control element of the known actuating device, by means of which a caravan testing function can be named, or by means of which, in combination with as independently arranged farther control element, a caravan retardation function and/ or an anti-jacking retardation function or deactivation of the ignition can be named. Simple and intuitive control is also possible in the case of a farther control element, which is actuated independently, for killing the automatic engagement of the parking boscage upon the deactivation of the ignition.

CONCLUSIONS

The present invention therefore provides a system which, compared to the known concepts, permits considerably greater availability with an extremely simple and favourable structural concept. "Greater availability" is understood to mean that the parking brake is to be as far as possible always capable of operating. In one advantageous development, a fourth signal line is provided which connects the two-wheel electronic systems of the electromechanical actuators directly to one another and in one preferred embodiment of the invention, the control element is equipped with at least three channels, and it outputs the driver's request in the form of at least three switching information items. The control element is supplied and/or evaluated from the brake controller or from the further controller. The control element has preferably electronic semiconductor components. In a further advantageous development of the subject matter of the invention, a redundant power supply of the parking brake system is provided. Here, the redundant power supplies formed by together with a charging circuit. Alternatively, the redundant power supply is formed by management system for a vehicle on-board voltage supply.

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