AUTOMATIC HAND BRAKE SYSTEM.

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***Abstract*— When we consider driving, car safety is something that we all look up to. It is extremely vital because the roads on which we drive are much more dangerous than we think. Car companies and automobile manufacturers have been more concerned regarding car safety by including safety features such as seat belts, air bags, head restraints, crumple zones, etc. One such safety feature in cars is hand brakes. Hand brakes in car are used to prevent the vehicle from rolling forward/backwards when parked or stopped. Besides, a hand brake can act as a hill-hold assist for steep slopes. The system can be built in a number of different ways. With so many important features in the car, it becomes difficult to co-ordinate with accelerator, break, clutch, steering wheel, hand brake, etc. Hence an automatic handbrake release system is presented.**

***Keywords*— Auto Hand Brake Release, DC Motor, Smart handbrake, Automobile, Conventional, Automatic, Smart Hand break**

I. INTRODUCTION

The automotive industry is the subject of this invention. In most cars, the handbrakes are latching brakes that are used to stop the vehicle. It can be used at various places ,for instance when you park the car, the rolling brakes stops the car from rolling forward/backwards, then when waiting at the traffic signal where instead of continuously pressing the brake pedal, you can engage the hand brake while waiting at red traffic signal, at uphill starts and when the brakes fail. Braking systems, like the majority of modern automobiles' other essential components, are constantly evolving. All cutting-edge automotive technology revolves around improving safety features and overall vehicle performance. Here, an automatic handbrake system is discussed which makes handling of multiple things as at a time. This system is considered safer than the traditional ones especially when operated at speed. The objective of this project is to provide a dual hand brake system for smooth and hassle free driving, to increase the safety efficiency in automobiles and to design a system which is convenient to use.

II. PROBLEM STATEMENT

The safety system in an automobile is the handbrake (parking brake). The handbrake lever is manually manipulated to operate the conventional machine. In this mode, manual errors cause the brakes to stay engaged even when the car is moving. This circumstance creates safety risks that could harm the system's components. The goal of the study is to minimize human intervention by modifying the present handbrake system to add automation in system.

III. OBJECTIVE

1. To create an automated system to lessen manual interaction with humans
2. In the event that the hand brake is not entirely removed or locked during an emergency braking system action, to maintain the correctness in hand brake operation.
3. With this improved technology, Handbrake will be controlled both manually and automatically.
4. It will enhances the experience of parking in slopes.

IV. LITERATURE SURVEY

1. Development and experimental validation of an automatic parking brake system with less driveline sensor.(Science China Press and Springer-Verlag GmbH Germany, part of springer Nature 2018)

This research looks at a novel automatic parking brake system with fewer driveline sensors, as well as its design, control, and experiment validation. A practical mass estimating approach, an indirect judging of the parking brake force releasing time, and a smart mechanical redundancy operation design are all discussed in depth. The author's suggested automatic parking brake system is far superior to the electronic parking brake system. Other advantages of APB include faster drive-off performance without back-roll, increased dependability, and lower cost. The suggested automatic parking brake system is suitable for a wide range of automatic transmission vehicles.

2. Design And Fabrication of electromechanical parking brake System
(Sumant Ashok Nayak, Kiran G, Kushal P S, Madhu B V and Dr. Ravishankar M K)

An electrical motor, a geartrain train connected to the motor, and a lead screw that pushes the restraint comprise a vehicle's electromechanical braking system. With its simple and affordable features, this concept offers a whole new thought style for the EMPB system. This paper discusses the EMPB system's design, analysis, and construction. Mechanical device brake systems, often known as brake by-wire, swap out standard parking braking systems for an extremely electrical component system. This is achieved by commutating common connections with electrical motor-driven devices. High-performance electrical motors and equipment reduction, controlled by an ECU, directly produce braking force at each wheel.

3. Design and testing of a new electrical parking brake actuator
(Chien-Tai. Huang, Chien-Tzu chen, Shou-Yi Cheng, Bo-Ruei chen and Ming-Hu Huang)

In comparison to the antiquated handbrake technique, the electric parking brake (EPB) system allows vehicles to move more freely. The intelligent functions that make vehicles more comfortable and secure, as well as prevent vehicle damage and danger caused by irresponsible drivers, are realised by combining an impact unit. This article presents the EPB system in a brand-new idea style with simple and affordable features. The testing results demonstrated the success of this design. The presentation of experimental knowledge is usually followed by an explanation of the new style's operating principle, and then we introduce the testing system's configuration.

4. Slide Mode control for integrated electric parking brake System.
(Bin Wang, Xuexun Guo, Chengcai Zhang, Zhe Xiong, Huan Xia, Jie Zhang2)

A study and introduction of the rising integrated electrical brake (IEPB) system are provided. The various operating stages were investigated, and the stages switched IEPB system models were given an understanding of friction and system idle inertia. The widely used motor angle and clamping force relationship methodology is used to govern the clamping force via the sliding mode management (SMC) methodology. The properties of the state equations support the design of two sliding surfaces that regulate the motor angle and current separately. Furthermore, management stability is ensured in each operational phase by selecting management parameters based on Lyapunov theory and SMC reachability. The planned system's effectiveness has been validated in MATLAB / Simulink.

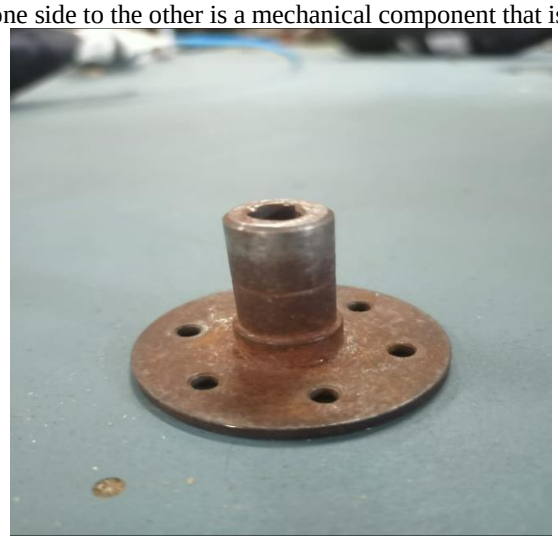
5. Novel design of the integrated electric parking brake system.
(Yan-Sin liao, Chien-Tai Huang, Chien-Tzu chen, Shou-Yi Cheng, Bo-Ruei chen and Fu-Yen Huang Automotive research & Testing Center (ARTC).)

The iEPB, a novel type of integrated electric parking brake system embedded within the brake calliper, is introduced in this study. It has multiple hydraulic and electrically driven brake units, and it employs a novel automatic system rather than a screw method to increase potency and operating speed. Along with all of the benefits of a standard EPB system, it also provides improved brake performance and lower latency. We tend to describe the operating principle of this novel design first, then introduce the testing system, and finally provide experimental knowledge in this paper. The testing results have demonstrated the design's success. The conclusion paragraph summarises the key points concerning the IEPB system's design.

V. COMPONENTS

1. Coupling:

The ability to transfer power from one side to the other is a mechanical component that is transferred from one side to the other.



Female Coupling.

2. Potentiometer

The component, hence its name, is based on the same concept as the measuring device known as a potentiometer, which is essentially a voltage divider used to measure electric potential (voltage).

Potentiometers are commonly used to control electrical devices such as volume controls on audio equipment. Potentiometers controlled by a mechanism, for example, can serve as position transducers with a joystick. Potentiometers are rarely used to directly control significant power because the power dissipated in the potentiometer is similar to the power dissipated in the regulated load (more than a watt).

In our project we use potentiometer for detection of Hand Brake position.

Potentiometer

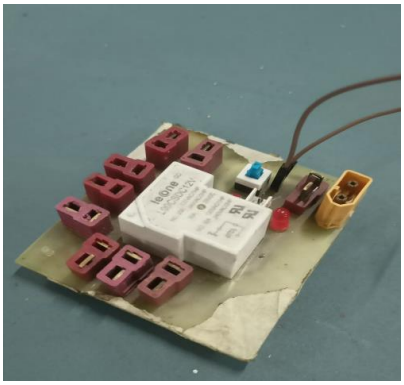
3. DPDT switch.

A double pole double throw (DPDT) switch is made up of six terminals, two of which are separate input terminals. Each pole has the ability to complete two distinct circuits. In other words, while there are four output terminals in total, only two of them are linked to each input terminal.

Dpdt Switch

4. Switch Board.

For distribution of Voltage.



5. Battery

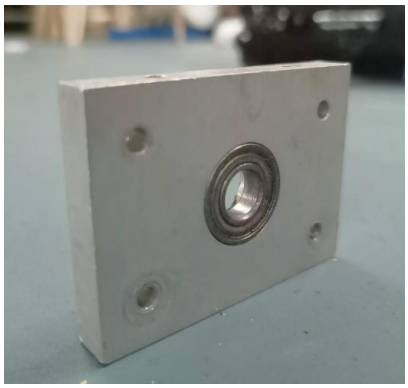
12V Battery for DC supply.

6. Motor

555 motor

Here we use 555HP motor for engagement and disengagement of break.

7. Bearing Plate.



Bearing Plate.

8. Cyctron Motor Driver.

This driver supports PWM signals with locked-antiphase and sign-magnitude. It employs only fully solid-state components, resulting in faster response times and eliminating mechanical relay wear and tear. Two brushed direct current (DC) motors are controlled in both directions. The voltage range for support motors is 5V to 25V.

9. Arduino uno R3

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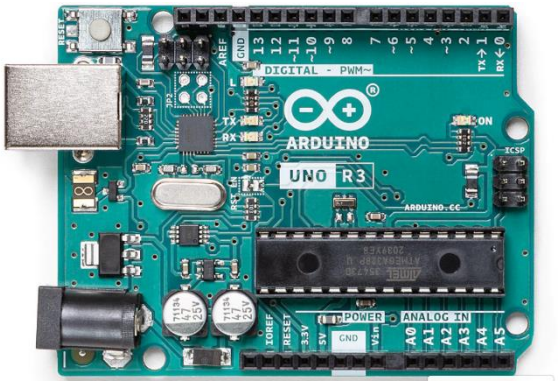

Arduio Uno series

VI. WORKING METHODOLOGY

Car ignition system can be manufactured in a way so that the driver will not cause any difficulty in applying hand break.
The main motive is to overcome the problem which is the cause of engaging or disengaging a hand break.
First of all to plan a road map of project automatic hand break was the main factor. It is being automatic causes problems in situation such as a car at a slope .
Therefore totally automatic hand break may not be good solution .
Hand break system with automatic and manual operation took further for deep study.
1. The design of hand break system at ignition basically meant is automated hand break release after driver starts the car.
The system can be built in a number of different ways. Shortlisting those to get one of them more feasible for small scale prototype.
2. Using pneumatic piston
: in this method hand break release and engaging takes place due to the signal produced at drivers end when he starts car.
When car starts we will have disengagement between the breaks.
And as a safety purpose annual use is implemented in case of situations like slope or in traffic .
In this assembly as robot have to pick the ring the ring
3. Using motor method
:The assembly of automated hand break in 2nd way.
It makes work and efforts Reduced .
In this construction of Coupling bearing plate
Is bit easy. Both the ways are equal in little bit manner

VII. ACTUAL HARDWARE

VIII. CONCLUSION

The current system could be upgraded to an automatic hand brake system, which would be an efficient way to reduce the amount of human effort required to apply a manual hand brake.
This technology has the potential to improve braking and parking safety. It provides quick braking and is simple to operate. Thus, using this technology, the traditional hand brake system may be eliminated, and operator error can be completely eliminated.

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