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# Safety Belt Operated Pneumatic Handbrake

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***Abstract:*** ***In this Paper we studied that in a ground vehicle, mechanical parking brake (Hand brake) unit is a mechanism that used to hold the vehicle motionless either on the even or gradient road. It consists of a directly linked to the brake mechanism on one end and to a mechanism that can be motivated by the driver on the other end. This actuating mechanism is often a hand-operated lever on the base on either side of the driver, or a pull handle located below and close the steering wheel column or a (foot-operated) located far separately from the other pedals. In order to confirm that a vehicle remains stationary when it is parked at a certain road slope, the driver has to apply adequate dragging force on the handbrake lever. Seat belt is applied in car to ensure drivers safety. The rise in number of loss of life in accidents is due to driver's carelessness to wear seat belt though it is strictly forced by law. The aim of our project is to make seat belt wearing compulsory for vehicle momentum. This could be achieved by using pneumatic setup along with handbrake. The change to be done ensures that the driver wears seat belt in driving. Here the seat belt of the car initiates the hand brake (parking brake) through a pneumatic cylinder.***
***The main benefit of this system is that traveller/driver safety, if we don't use seatbelt the vehicle handbrake dose not removes for safety. This system will be employed in car to ensure travellers/driver safety. It reduces in number of loss of life in accidents. We can attain it by using pneumatic setup along with handbrake.***
***Keywords—Handbrake, Seatbelt, Pneumatic Fitting, Modified System, Automation.***

## I. INTRODUCTION

The main purpose of this project is to confirm drivers safety through a improved handbrake in car .`A handbrake is an added braking mechanism mounted on all commercial vehicles that's completely distinct from foot pedal -operated In cars the parking brake, also called hand brake, alternative brake, or brake, is a latching brake, usually used to keep the vehicle motionless. Most commonly used to avoid the vehicle from rolling when it is parked. Automobile hand brakes consist of a cable directly linked to the brake mechanism on one end and to a lever at the driver's location. Using your handbrake to stop a moving car can damage the brake arrangement.

Pneumatics is a subdivision of technology that deals with the study and application of forced gas to produce mechanical motion. Pneumatic systems that are used widely in industry and factories are normally plumbed with compressed air or compressed inert gases. This is because a centrally located and electrically driven compressor, that powers cylinders and other pneumatic devices through solenoid valves, can regularly provide motive power in an inexpensive, safer, more flexible, and more reliable way than a large number of electric motors and actuators. Pneumatics also has applications in dentistry, building, mining, and other areas. Welding, superior isolating qualities and design adaptability. Easiness of design and control - Machines are easily designed using typical cylinders and other components, and operate via simple on-off control. Reliability Pneumatic systems generally have long functional lives and require slight maintenance. Because gas is compressible, Equipment is less subject to shock damage. Gas absorbs unnecessary force, whereas fluid in hydraulics directly transfers force. Compressed gas can be kept, so machines still run for a while if electrical power is lost. [1]

Seat belt use in 2015 touched 88.5 percent, up from 86.7 percent in 2014; this was not a statistically major change. This result is from the National Occupant Protection Use Survey (NOPUS), which is the only survey that provides country wise probability-based perceived data on seat belt use in the United States. The NOPUS is conducted annually by the National Centre for Statistics and Study of the National Highway Traffic Safety Administration. In 2015, NHTSA conducted a reshape to select a new NOPUS sample representative of the most current demographic and traffic circumstances. [2]

Investigation has found that lap/shoulder seat belts, when used, decrease the risk of serious injury to front-seat passenger car occupants by 45 percent and the risk of moderate-to-critical injury by 50 percent. In 2014 alone, seat belts saved an estimated 12,802 lives.

## II. INTRODUCTION OF PARKING BRAKE

The parking brake system is a subordinate braking method used to hold a parked car in location. They are applied individually of the



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service brakes. Since there is no inertia to overcome, less braking power is needed to hold the vehicle motionless and less force is required to apply. The application of only two of the four brake assemblages are required to grasp the vehicle.

## III. STATEMENT OF PROJECT

The statement of project is "design & manufacture of seat belt actuated hand brake" for used in safety brakes of automobile. Seat belt is employed in car to confirm driver's safety. The rise in number of loss of life in accidents is due to driver's carelessness to wear seat belt though it is strictly compulsory

## IV. OBJECTIVES

*A.* To design seatbelt arrangement they will control the vehicle handbrake for safety.
*B.* If driver goes to run without wearing the seat belt the handbrakes could not be disengaged. By this driver's safety is confirmed
*C.* To reduce the extra hard work during operation of handbrake at the time of starting of vehicle braking system.
*D.* To maintain the correctness in hand brake operation in case of hand brake is not fully remove or lock in case of emergency braking system action.
*E.* To develop automation unit in automobile emergency braking system, so that machine can easily be accepted in today's automated braking system in vehicle.
*F.* This type of braking system affords work practically at low cost, low maintenance, low capital investment in less space in same system in place of conventional handbrake.
*G.* To achieve the most stiff operation with safe braking system at the time of starting & stopping of vehicle.
*H.* The main advantage of this system is that travellers/driver safety, if you don't use seatbelt the vehicle handbrake dose not remove for safety.

## V. CONSTRUCTION

A. *Frame*

The frame is of MS material. The frame of our machine is mainly used to support the pneumatic components fixed on it.

B. *Double acting cylinders*

Cylinders are linear actuators which transform fluid power into mechanical power.




Fig.1Double acting cylinder. [3]

C. *Pneumatic pipe fittings*

Pneumatic tubing is also available in a number of other materials both with and without reinforcement for use in standard applications.


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D. *Hand brake set*



Fig.2 Hand brake set. [4]

E. *Seat belt and lock clamp*



Fig. 3 Seat & belt lock

F. *Solenoid type 5/2 dc valve*

A valve is a device that controls the flow of fluid (gases, liquids, fluidized solids or slurries) by opening and closing or partly obstructing passage ways.

G. *Timer with relay board*

The repeat cycle timer was recognized to control solenoid valves or other modules that require intervallic energization.

## VI. WORKING

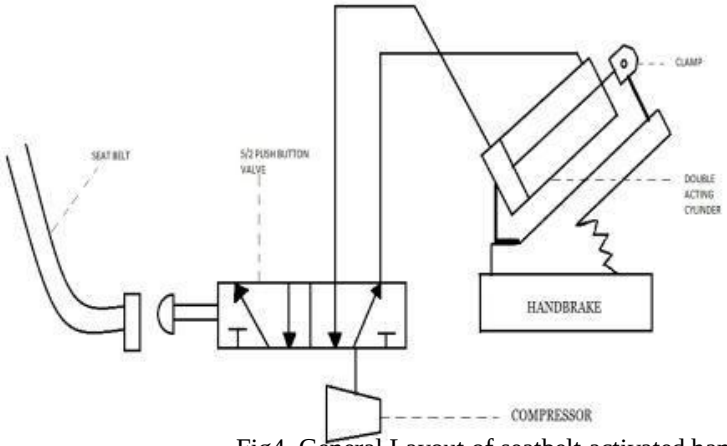



Fig4. General Layout of seatbelt activated hand brake.

The inlet port of the 5/2 pneumatic solenoid valve is been connected to the compressor. And the output port is connected to the double acting cylinder. The 5/2solenoid valve is been integrated with in the seat belt locked trough timer. The timer is ported on 12v transformer. The double acting cylinder is clamp along the body of hand brake. The wind of the piston rod is plotted with clamp



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connected with the hand brake the buzzer is connected with the timer for emergency purpose.

When the vehicle at rest position hand brake is engaged. then vehicle is started by the drive compressor is run and it create air after wearing of the seat belt limit switch operate and it is connected to the dc valve trough timer to the relishing of hand brake air from compressor is comes in double acting cylinder trough DCV for engaging hand brake

When the seat belt is locked air within the cylinder is exhausted through DCV in case during the running condition on of vehicle suddenly wear out buzzer gives indication after some time which set in timer.

## VII. ADVANTAGES

*A.* The safety of driver is ensured.
*B.* Manual effort in engaging the hand brake is reduced.
*C.* Both seat belt wearing and brake release is done in single action.
*D.* The cost of brake modification is low.
*E.* The operation of the new system is well controlled.
*F.* Well secured system.
*G.* It approximately having higher efficiency that of old handbrake in low cost application brakes.
*H.* It minimizes misalignment & less floor space is essential.
*I.* Only simple support structures are required Design & manufacture is easy.
*J.* It increases the safety and working condition

## VIII.APPLICATION

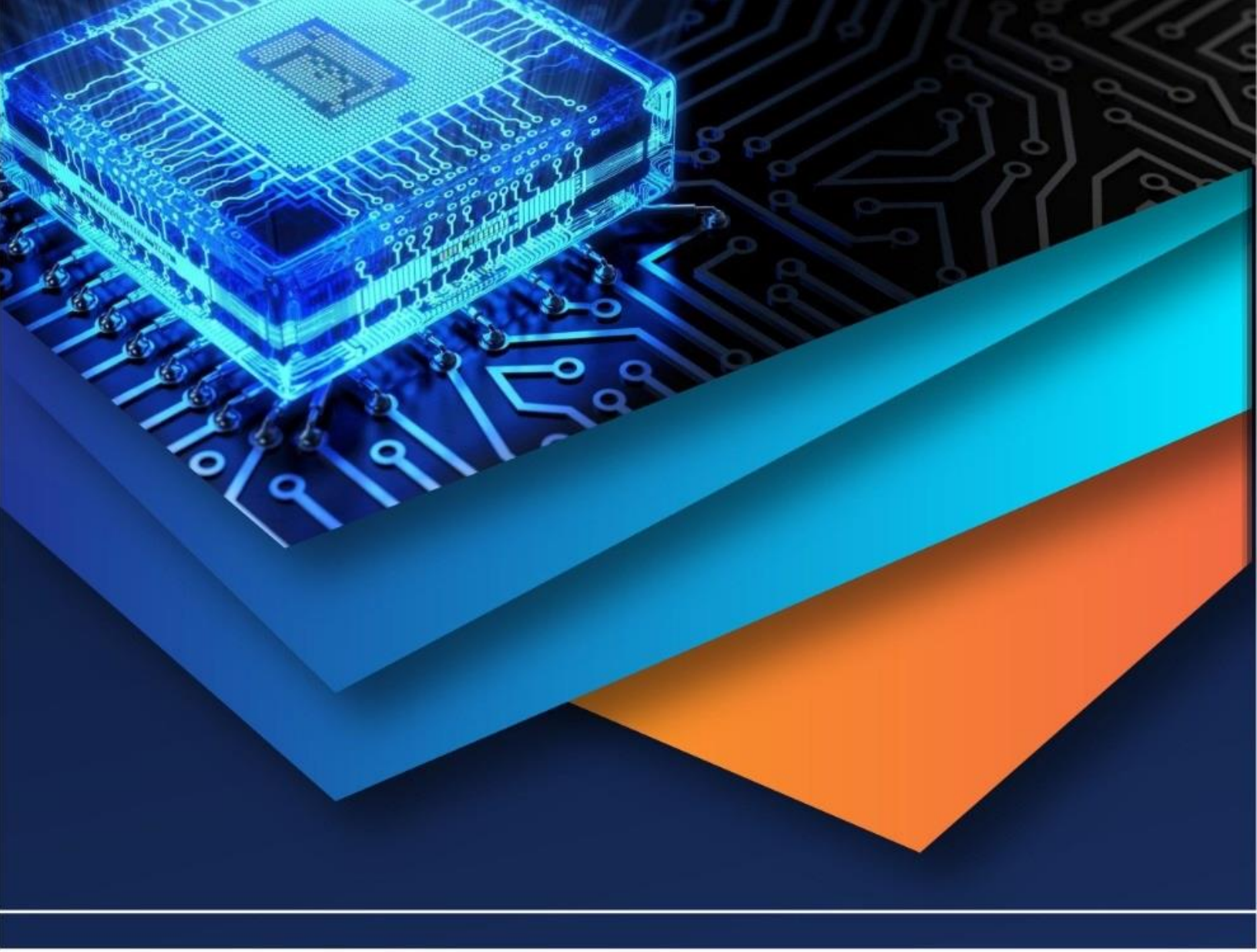
It is used for handbrake of commercial vehicles like Car, Buses & Trucks automation system

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