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AUTOMATIC HAND BRAKE SYSTEM: A REVIEW

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Abstract— Hand brake is one of the most important components in vehicles. In general the hand brake is operated manually but in our project, we are developing automatic hand brake for safety purpose of vehicle. In cars, the hand brake, also called parking brake or emergency brake. It is usually used to keep the vehicle in stationary condition. The parking brake operates mostly on the rear wheels of the vehicle. It is sometimes also used to prevent a vehicle from rolling when the operator needs both feet to operate the clutch and throttle pedals. Large vehicles are usually fitted with power operated or power assisted handbrakes so force required to operate the handbrake in large vehicle is very less.

But many accidents are happens due to forgotten of driver to apply hand brake. So to reduce these accidents the automation in hand brake is necessary. So tohelp to reduce these types of accidents, we are working on this project.

Keywords—12 volts battery ,Limit switches ,Trigger (rack and pinion mechanism),Indicator bulbs ,Hand brake

INTRODUCTION

In cars , the parking brake, also called hand brake, emergency brake, or e-brake , is a latching brake usually used to keep the vehicle stationary. It is very essential in cars and all type of vehicles. It is sometimes also used to prevent a vehicle from rolling when the operator needs both feet to operate the clutch and throttle pedals. Automobile hand brakes usually consist of a cable directly connected to the brake mechanism on one end and to a lever or foot pedal at the driver's position. The mechanism is often a hand-operated lever (hence the hand brake name), on the floor on either side of the driver, or a pull handle located below and near the steering wheel column, or a (foot-operated) 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 vastly increase the likelihood of loss of control of the vehicle, for example by initiating a rear-wheel skid.

Additionally, the stopping force provided by using the hand brake is small and would not significantly aid in stopping the vehicle. The parking brake operates mostly on the rear wheels, which have reduced traction while braking but in some cases, parking brake operates on front wheel, as done in most Citroens manufactured since the end of World War II. The hand brake is instead intended for use in case of mechanical failure where the regular footbrake is inoperable or compromised. Modern brake systems are typically very reliable and equipped with dual-circuit hydraulics and low-brake-fluid sensor systems, meaning the handbrake are rarely used to stop a moving vehicle.

SURVEY OF ACCIDENT HAPPENS ON THE ROAD-

Human factors in vehicle collisions include all factors related to drivers and other road users that may contribute to a collision. Examples include driver behavior,visual and auditory acuity, decision-making ability, and reaction speed

In which the different factors are contributes are as follow.Human factor - 57%, Vehicle factor - 6%, Road factor – 27% , Other factor – 10%

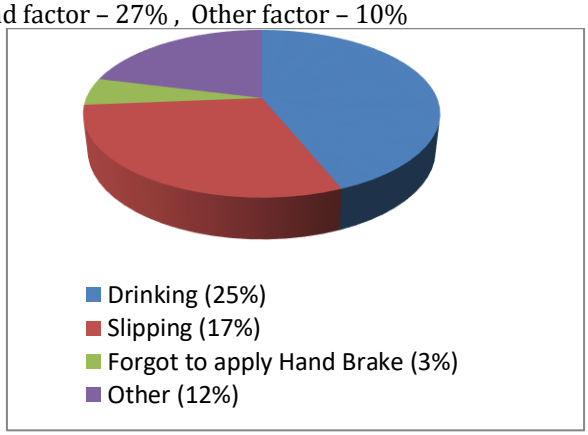

Fig2.1.2- Human factor classification

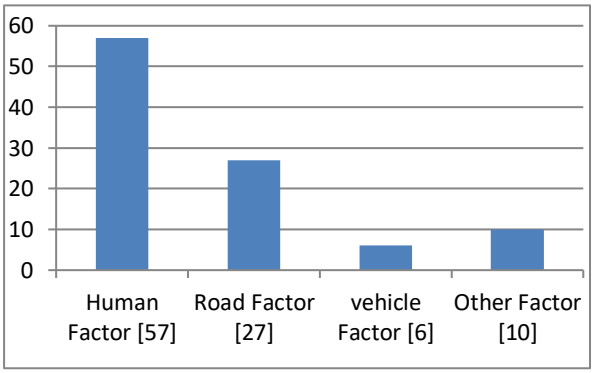

Fig 2.1.1- Analysis of Accidents

If we again divide the accidents which are happens due to human factor. It can be divided into the following four factor.

Drinking -25% , Slipping -17% , forgotten of applying hand brake - 3% ,

Other – 12% .

So to reduce this accident which happen due to forgotten of applying hand brake this is upto 3% and to improve safety of human and vehicle we are working on this project .

WORKING PRINCIPLE (OBJECTIVES OF THE PROJECT)

In our project we make such arrangement that hand brake should engage automatically, as soon as steering is lock by the driver. And it should disengage manually only.

With help of mechanical trigger, when driver lock the steering then current through 12 volt battery is given through limit switch to motor mounted on the pinion of trigger, and then it start rotating and gives rotary motion to pinion. after that the rack coverts this rotary motion into the linear motion and moves forward and actuate the hand brake.

The main function of **AHBS** (automatic hand brake system) is as following.

1) Automatically activated when steering lock is activated through the key.
2) Help the vehicle to start up without rolling backward on hills.

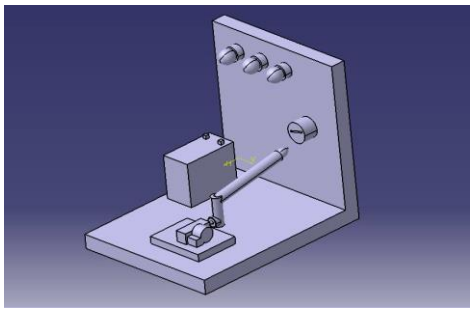

Fig. 3D CAD Model

Fig 3.1.2- Actual Photograph of Project

CONSTRUCTIONAL DETAILS

The main components of project are as follows

1. Battery
2. Trigger (rack and pinion mechanism)
3. Limit switches
4. Hand brake
5. Indicator bulbs
6. Central switch

Battery-

We use the battery as primary power source .the battery is of 12 volts. from battery the current is given to the trigger . There are a servo motor so the motor start and it gives requird rotary motion to pinion.

Fig 4.1.1- Battery

SPECIFICATIONS :

1. Company : JET MAX
2. 12 VOLTS 7.6Ah
3. WRLA BATTERY
4. Constant voltage change (25 C)

Table 4.1.1- specification of battery

Type	**Voltage regulation**	**Initial current**
Standby use	13.5V-13.8 V	Less than 2.40A
Cycle use	14.4V-15.0V	Less than 2.40A

Limit switches-

Limit switch is use to make and brake the circuit .limit switch is the device which allow to flow the current when needed . it is done by push button. When the outside rod is press it connect the curcite so current is given to the motor. It has two terminal at output and one at input.

Fig 3- Limit Switch

TRIGGER (Rack and pinion mechanism)

Trigger is the device in which the servo motor , rack and pinion mechanism is fitted. When the dc supply from battery is given to motor through limit switches it will

rotate . so rotary motion of motor is given to the pinion . pinion is attached to the rack so rotary motion is converted into linear motion . so we get requird motion and hand brake is actuated.

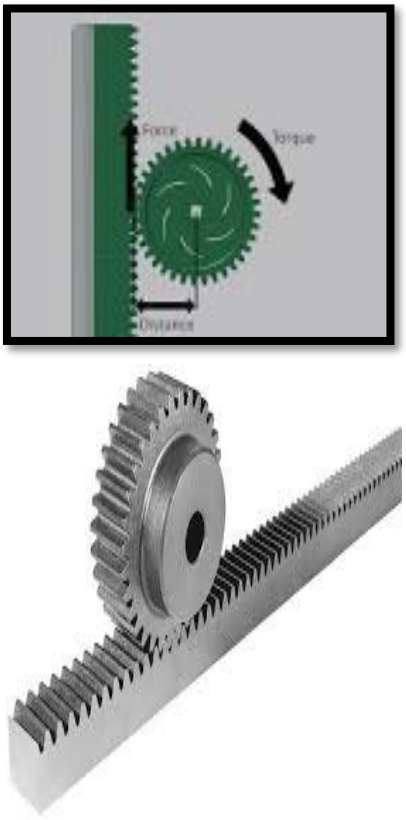

Fig 4- Rack and pinion gear

RESULTS / DISCUSSIONS

After completion of this project we get following results.

1) It reduces accidents caused due to forgotten of applying hand brake.
2) The hand brake are actuate when steering is lock.
3) It is easy to operate.

REFERENCES

- www.wikipidia.com
- Element of mechanical Engineering- R.G.TATED, V.V.THEATE
  Pearson Education Publication
- Design of Machine Element- R.S. KHURMI, J.K. GUPTA