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Design and Fabrication of Seat Belt Assisted Hand Brake Lever System''

Bhosale Yogesh Narendra, More Nilesh Mahendra, Gadhave Prithviraj Dilip, Teli Akshay Appasaheb, Prof. S. A. Dhake
Department of Mechanical Engineering
Navsahyadri Education Society Group of Institutions, Naigaon, Pune, Maharashtra, India

Abstract: *Hand brake is one of the most important components in vehicles. In general, the hand brake is operated manually. In our the aim of our project is to make seat belt wearing compulsory for safety purposes. We achieve it using an IR sensor and relay. We applied the brake using one solenoid valve. The seat belt is activated using the solenoid valve When the car engine gets started our solenoid gets activated and the brake will apply on the tires then whenever we don't put a seat belt on this solenoid valve doesn't get its original position. In this project, we are using Electromechanical parts like Relays, IR sensors, Solenoid valves, and disc Brake plates. With help of this, We are making a Design and Fabrication of a Seat belt Assisted Hand brake lever by using Catia software. This project is about Hand brake disengage is not happen until and unless the driver fastens the seat belt and due to this car will not run. It makes divers automatically Habitual to using the Seat belt of the car. Due to this habit, the number of accidents numbers will decrease or injuries of drivers may decrease.*

Keywords: Hand brake

I. INTRODUCTION

Our system is based on an automatic sensor as well as a push-button system. We know normally when we park the car we usually applied hand brake. Then when we want to start the car we forget to attach the seat belt and pay for it after a normal accident. And for this, we forced the driver to apply a seat belt. Driver does not remove hand brake until he applies seat belt we Make it necessary for mid-range cars. Our system starts with an IR sensor and fluctuating solenoid valve. Basically, the IR sensor senses the seat belt is off or on and then gives a signal to relay perform with signal to open or close the solenoid valve. Generally, as a result of emergency conditions, we forget to apply seat belts and get too much life and wealth damage. The main purpose of this project is to ensure drives safety through a modified handbrake in the car. A handbrake is an additional braking mechanism installed on all commercial vehicles that are completely separated.

In this project, we have designed the mechanism which is used to operate the hand The main purpose of this project is to ensure drivers' safety through a modified handbrake in the car. A handbrake is an additional braking mechanism installed on all commercial vehicles that's completely separate from foot pedal operated. In cars the parking brake, also called hand brake is, usually used to keep the vehicle stationary. Most commonly used to prevent the vehicle from rolling when it is parked. Automobile hand brakes consist of a cable directly connected to the brake mechanism on one end and to a lever at the driver's position. Using your handbrake to stop a moving car can damage the brake system. In this project, we have designed the mechanism which is used to operate hand brake using seat belt assist. While removing the hand brake this mechanism or system ensures the that seat belt is plugged in by the driver. As the driver acquire seat belt the hand bake gets free and can be

II. LITERATURE REVIEW

"WEARING OF SEATBELT IS MANDATORY FOR IGNITION OF ENGINE" Prof. Hemal Patel, Chauhan Abhijeetsinh, Badreshiya Deepak, Patel Harsh

In this research paper they say, An Major causes of death in road accidents are carelessness in safety while driving. In 2012, more than half of all people who died on Utah's roadways weren't buckled. Hence wearing seat belts might have reduced serious crash-related injuries and saved a life. Hence "Driver Assistive Safety System" (DASS) comprises techniques that

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inculcate the mandatory safety precautions via alarm, visual indicator, ignition, and speed control. This paper describes a safety system that ensures that the driver and co-passenger wear safety seat belts while driving a car. The driver-assistive safety system works on the „ignition interlocking" and "speed control" concepts. Early attempts to use technology to increase seat belt usage were not met with positive public acceptance. For example, in the early 1970s seatbelt ignition interlocks that prevented drivers from starting their vehicles without first buckling their seatbelts met with considerable resistance and were subsequently eliminated by an act of Congress (Kratzke, 1995). Subsequent efforts have focused primarily on public education, policy enforcement, and enhanced seat belt reminder systems. Here is the table view of protection by a seatbelt. By viewing and studying all the things we have concluded that for the safety of the people seat belt is mandatory but some circumstances make them optional. Seat belts are by far the most important safety feature of your car. No matter what speed you are going, or how far you will be traveling it is extremely important to always have your seat belt on. If you are wearing a seat belt at the time of a crash, your risk of being killed is reduced. Seat belts protect the driver against injury in a collision. They lessen the chance that you or your passengers will be thrown against the dashboard, through the windshield, or out a door that has sprung open in a crash. In addition, seat belts help keep you behind the wheel and in control of the car if you have to swerve.

III. PROPOSED SYSTEM

There is much more research paper available on the internet so we conclude that information in our project. We customize these changes in the project we add extra information and a develop new system maybe it's become part of the vehicle in future. All information available about the present system is available on the net we just try to modify and develop new things using available sources. About the part, we used we search about them already on the internet and get basic information about all the sensors and relay and other parts like bearing.

IV. IMPLEMENTATION

With the information we get using it we try to replace the Microcontroller by using a relay to get input and output and giving the right output to the solenoid valve. The solenoid valve reacts with the signal it gets. We add an IR sensor for sensing whether the seat belt is attached or not which is basic of our project. We also add push in it for mechanical linkage for extra options or smooth and regular working. The battery we used is 12 volts. Actually, the relay does not require 12 volts it is near 6-7 volt

V. EXPERIMENTAL RESULT

The main component of the project is a seat belt hook, IR sensor, Really, Solenoid Actuator, braking system, Disk, shaft, and the supporting member and structure. The IR sensor is installed near the bottom steady seat belt hook. When We attached the seat belt Hook and use the seat belt, IR sensor detects the movement and transfer the signal to the relay. The microcontroller used in this system is Relay.

So after receiving the signal from the IR sensor, the microcontroller operates the solenoid actuator to release the brake from the wheel.

When we placed the seatbelt hook in the seatbelt buckle then the IR sensor which is placed near it detects detect the position of the seatbelt belt buckle and gives a signal to the Relay When the

The relay coil is de-energized, NC contact becomes open, and NO contact closes. Which actuates the solenoid valve thus brake gets disengaged. Its total safety purpose project which gives a total indication about their safety. Its do not allow the driver to drive a car without a wearing seat it's mandatory to reduce accident and damage percentage in India. It also gives extra safety with small prices in midrange vehicles. Its next step moves to the alarm system in the current vehicle system. It is affordable and cheap for all price ranges. This system gives you electrical as well as mechanical linkage options for smooth or proper working alignment without any disturbance. It also we can be used for learning students of new commerce in driving school.

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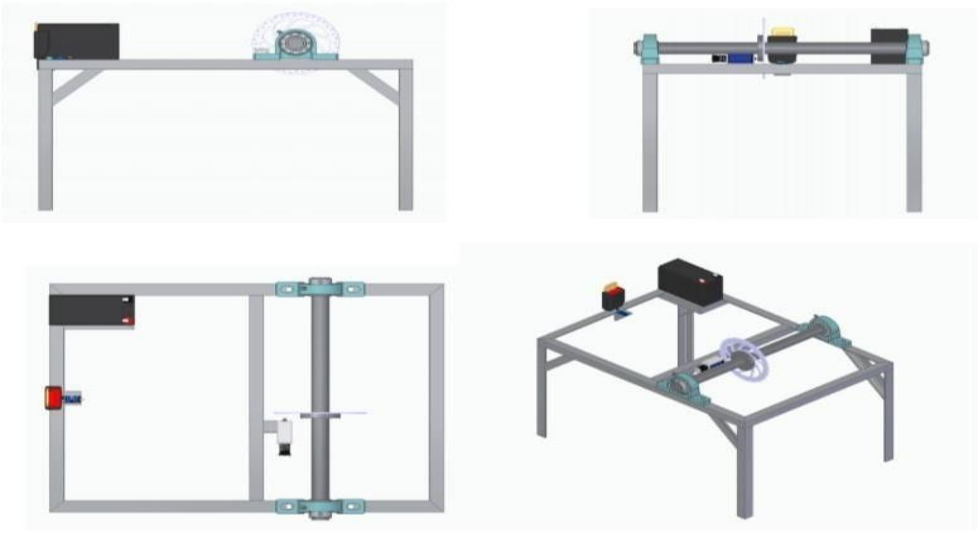
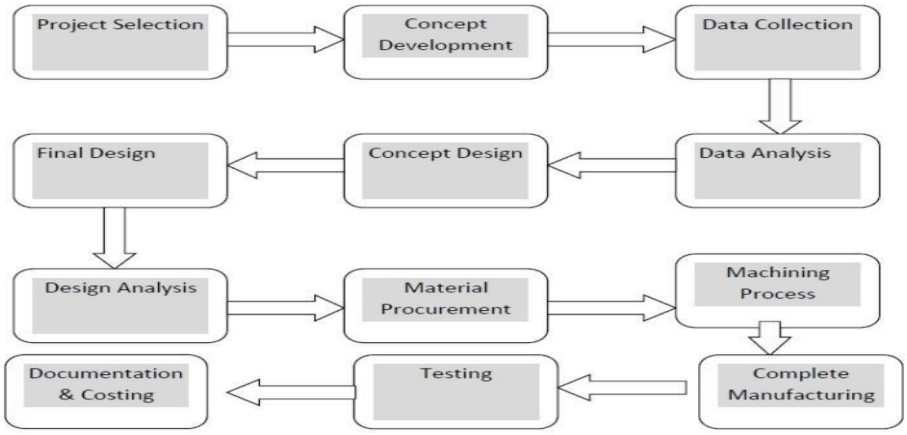
DESIGN AND FABRICATION OF SEAT BELT ASSISTED HAND BREKE LEVER DESIGN SHOW IN FIGURE
3D DESIGN



METHODOLOGY:



CALCULATION:

We are doing simple SFD and BMD calculations for the shaft we have selected Considering the load acting on the shaft is 2kg (a load of tire)

So, F= m x g F= 2 x 9.81

F= 19.62 N

The shaft is simply supported from both the ends

So we consider simply supported beam calculations for finding the maximum bending moment and shear force acting on the shaft

As we know for shear force equation

Sum of horizontal forces, Σ Fx= 0, Σ Fy = 0 Ra + Rb – W = 0

$\therefore$ Ra + Rb = 19.62 NAL = 0

Moment about A and B = 0 AR = 9.81 N

Ma= (Rbx 1) – (19.62 x 0.5) CL = 9.81 N

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As we know, CR = -9.81 N
Rb = 9.81 NBL = -9.81 N
Ra + Rb = 19.62 N BR = 0 N
Ra = 9.81 N
BMD Bending moment at point load, Bending moment at point C,
Mc= (Ra x L) = (9.81 x 0.5) = 4.905 Nm F=19.62N
Maximum bending moment= WL/4
= 19.62 X 1000 / 4
= 4905 N-mm
Moment of inertia= π 64 D4
= 19175 mm4
M/I = σb / y
σb = 3.19 MPa
This stress is less than the yield point strength of the material hence the design is safe.
4.3 Shaft Design We are doing simple SFD and BMD calculations for the shaft we have selected Considering load acting on the shaft is 2kg (load of tyre) So, F= m x g F= 2 x 9.81 F= 19.62 N Shaft is simply supported from both the ends So we consider simply supported beam calculations for finding the maximum bending moment and shear force acting on the shaft fig.no.4.3.1 SFD As we know for shear force equation Sum of horizontal forces, Σ Fx= 0, Σ Fy = 0 Ra + Rb – W = 0 $\therefore$ Ra + Rb = 19.62 NAL = 0 Moment about A and B = 0 AR = 9.81 N Ma= (Rbx 1) – (19.62 x 0.5) CL = 9.81 N As we know, CR = -9.81 N Savitribai Phule Pune University Navsahyadri Education Society Collage of Engineering, B.E(Mechanical) 52 Rb = 9.81 NBL = -9.81 N Ra + Rb = 19.62 N BR = 0 N Ra = 9.81 N fig.no.4.3.2 BMD Bending moment at point load, Bending moment at point C, Mc= (Ra x L) = (9.81 x 0.5) = 4.905 Nm F=19.62N Maximum bending moment= WL/4 = 19.62 X 1000 / 4 = 4905 N-mm Moment of inertia= π 64 D4 = 19175 mm4 M/I = σb / y σb = 3.19 MPa This stress is less than the yield point strength of the material hence the design is safe.

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