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# Fabrication of Accelerator and Brake in a Single Pedal

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**ABSTRACT:** This task manages the creation of gas pedal and brake in a solitary pedal. It has been noticed that some car crashes are brought about by squeezing some unacceptable pedal. It has been accounted for that some car crashes are brought about by erroneously pushing down the gas pedal, when the expectation was to push down the brake. It can hence be assumed that a few drivers find it troublesome in moving their foot from the gas pedal to the brake pedal rapidly. Blend of brake and gas pedal is especially helpful for driver. Thus, to take care of this issue of disarray to driver this creative venture would help in diminishing the disarray. In this venture a solitary pedal is utilized to control the gas pedal and slowing mechanism. A model has been made and last test has been finished. This framework can be utilized in any vehicle.

**KEYWORDS:** AC Motor, Pedal, Wheel hub, Accelerator and Braking System, Master Cylinder.

## I. INTRODUCTION

Almost 16,000 preventable accidents happen every year because of pedal blunder - when a driver confuses the gas pedal with the brake pedal causing unexpected vehicle speed increase. Pedal mistake accidents can make injury vehicle tenants, encompassing drivers, walkers and property. Thus, this development can assist with lessening to the quantity of mishaps happening because of pedal mistake. This is a mix gas pedal and brake control system where in there is a solitary pedal, serving both as the charge control and the brake control. The single pedal is pin jointed on a segment which is fixed on the casing. One finish of segment is pin jointed to the pedal and the opposite end is fixed to the casing of the model. The brake working switch is pin jointed to the casing and the associating bar is associated through a similar pin joint which is thus connected to the push rod of the master cylinder. The free drifting pedal contacts the gas control framework and the brake control switch. Whenever the pedal is squeezed and moved in the clockwise heading the pedal contact the gas control framework from unbiased position and supplies the expected power. Also, presently when the pedal is squeezed and moved in anti-clockwise heading the pedal activates the brake control framework. Hence a solitary foot can be utilized to control the two tasks.

As customary pedals are furnished with isolated gas pedal and brake. Generally the clutch is to the left, the gas pedal to the right and the brake in the center. The right leg ought to be utilized to press the both gas pedal and brake. If we have any desire to apply the brake to the vehicle then it would require something like 0.2 second to move the leg from gas pedal to the brake pedal. The time expected to move the leg from gas pedal to the brake pedal can be diminished by utilizing this component. Subsequently, at 75 kilometer each hour this would add a six meter to vehicle's halting distance. Besides, because of sight confusion it is not difficult to stir things up around brake pedal which prompts gas pedal being cut, causing an accident. This new component empowers the driver to control speed increase and slowing down utilizing one feet, which will prompt decrease in halting distance, confusion and at last lessening in number of road accidents that might happen every day.



## II. LITERATURE SURVEY

1. **Katsuya Matsunaga**, Ph.D in her research paper “**New Brake Pedaland Accelerator Bar Systemto Prevent theMistakeof Pressing Downthe Accelerator Insteadofthe BrakeinEmergency Situation**” done an experiment in developing a new brake pedal and accelerator bar system. In this the N system is used which provides a driving control mechanism which permits the quick and smooth transition from acceleration to braking, without needing to transfer the foot from one pedal to another.
2. **Rickard Nilsson** (2002) in his research paper “**Evaluation of a Combined Brake Accelerator Pedal**” has conducted an experiment and concluded that, the transition from the standard pedal to the combined brake–accelerator system is easy and relatively painless. Incorrect driving behaviors quickly abate, mostly before the driver completed 500 km of driving. The goal of his study is to highlight problems that drivers may face when they switch between pedal systems. The results indicate that drivers were able to learn the new combined pedal mechanism quickly and effortlessly and that the number of mistakes was extremely low during the acquisition phase in learning the new system. He also concluded that future experiments of the new combined pedal are desirable.
3. **Sahil Arora** (2016) in his research paper “**A Combined Pedalfor Brakeand Accelerator**” he concluded that this new mechanism results in avoiding interference of braking during acceleration and vice versa. Moreover, it is advantageous over conventional pedals. This combined pedal mechanism thus provides a driving control which permits the quick and smooth transition from acceleration to braking, without needing to transfer the foot from one pedal to another. The mechanism used for combined brake and accelerator is simple and can be adopted conveniently.
4. **N. Ramachandran et.al** (2017) in his research paper “**Design and Fabrication of Brake and Accelerator by using Single Pedal**” conducted an experiment in order to eliminate the operator risk of pressing the wrong pedal. It involved construction and working of Accelerator and Brake operated by single pedal using on/off and cutoff limit switches for electronic vehicle and this same technique is also applicable to normal vehicles. He concluded that this new mechanism results in avoiding interference of braking during acceleration and vice versa. The rapid increase in number of vehicles on roads day by day, demands an exploration of such mechanism to get rid of driver’s effort and reduce road accidents. This innovative project will be useful for physically challenged person in future.

## III. BASIC FUNCTIONING

The basic functioning of this model is to control both the acceleration and brake using a single pedal. Here a motor is connected to a switch which is mounted on a column. When the power is put on it will be in idle position. And now when the pedal is pressed and moved in the clockwise direction, it presses the switch. Now the switch passes the electricity to the motor and it starts to rotate. Now the motor rotates the wheel hub which is connected to the motor with the propeller shaft. The wheel hub rotates until the motor gets the electricity. And now when the same pedal is pressed in anti-clockwise direction. The pedal presses the push rod of master cylinder and in turn it applies the brake to the wheel hub.

## IV. METHODOLOGY

In this model, we can apply the both gas pedal and brake utilizing single pedal. To guarantee the working of this model. We made a casing of cross-segment 530\*455mm. The material used to make the casing is mild steel of 2mm thickness and of angular cross-section. On the left half of front end we mounted an motor utilizing bolted joint on the casing. The output power of motor we utilized is 0.25hp. Also, the wheel hub is mounted on the right half of the edge. The motor and wheel hub is associated with one another utilizing propeller shaft. And now the pedal to work gas pedal and brake is put at the rear end of the casing. To grandstand the brake we have utilized hydraulic braking system. The pedal is organized utilizing a pin joint. At the point when the pedal is moved at the top point the gas pedal is activated. Furthermore, when the pedal is moved to the base point the brake is impelled. At the point when the brake is squeezed utilizing the foot the brake lever pushes the push rod of the master cylinder. The wheel hub comprise of a brake drum. When the piston rod arrangement moves forward inside the master cylinder. The compressed fluid is moved to the brake drum. The fluid applies tension on the wheel hub and stops it. At the point when the gas pedal is squeezed it again rotates the wheel hub.



## V. CONSTRUCTION AND COMPONENTS OF THE MODEL

The fabrication of accelerator and brake in a single pedal requires the following components to complete the prototype model.

1. Frame
2. Pedal
3. Master cylinder
4. AC Motor
5. Axle
6. Wheel hub
7. Propeller shaft
8. Drum brakes

### FRAME

A frame is an inflexible part that contains no less than one part. It is an underlying part which upholds different parts of an actual development as well as steel outline that cutoff's the development degree. It tends to be of various construction like bended or straight. The utilization of frame is to oppose the moment which are created during the applied stacking. A casing ought to have high burden endure limit. Supporting the parts of a machine ought to be capable.

The frame in the below model is supporting the Motor, Wheel hub, Brake drum, Axle, Braking system, Pedal, Master cylinder etc., The frame absorbs the vibration coming from the motor, wheel hub and brake drum. It resists the moments which are developed inside the components.



Fig 1: -Frame

### PEDAL

The pedal framework assumes a significant part in controlling the vehicle, because of its high utilitarian thickness at drivers/vehicle interface. There are 3 pedals on the floor of the driver's side of the vehicle, which a driver use to control the power and speed of the vehicle: the gas pedal, the foot brake and the clutch.

The gas pedal is utilized to speed up the vehicle. The right foot is utilized to press the gas pedal. The gas pedal is arranged to right side of the brake. The brake pedal is utilized to apply the brakes of the vehicle, at whatever point the vehicle is expected to stop or dial back the vehicle. The right foot is utilized to press the brake pedal. The brake pedal is set between the gas pedal and clutch pedal. The clutch is utilized to switch the gear of the vehicle. The left foot is utilized to engage and disengage the clutch. It is set to left side of brake pedal.

In this project we are using a single pedal for braking and acceleration to quickly stop the vehicle. A combined pedal component is intended to work as both brake and gas pedal, which can be embraced by driver rapidly and easily. This new system empowers the driver to control speed increase and slowing down utilizing single foot, which will prompt decrease in halting distance, misconception and at last diminishing in number of road accident that might happen every day.



Fig 2: -Pedal

#### MASTER CYLINDER

In automotive engineering, the master cylinder is a control device that converts force (regularly from a driver's foot) into hydraulic pressure. This device controls slave cylinder situated at the other end of the hydraulic brake system.



Fig 3: -Master Cylinder

The master cylinder, otherwise called the master brake cylinder, changes over the pressure on the brake pedal to hydraulic driven strain by taking care of brake liquid into the brake circuit and controlling this as per the mechanical power. As cylinder's move along the bore of the master cylinder, this development is moved through the hydraulic fluid, to bring about a development of the slave chamber's. The hydraulic pressure made by moving a cylinder (inside the drag of the expert chamber toward the slave chamber's) packs the liquid equally, yet by differing the similar surface region of the master cylinder and each slave chamber, one can change how much power and relocation applied to each slave chamber, comparative with how much power and dislodging applied to the master cylinder. The master cylinder we are using here is Bosch made.

#### AC MOTOR

An AC motor is an electric motor driven by a substituting flow (AC). The AC motor generally comprises of two essential parts, an external stator having coils provided with alternating current to create a rotating magnetic field, and an inside rotor connected to the result shaft delivering a second rotating magnetic field. The rotor attractive field might be delivered by long-lasting magnets, reluctancy saliency, or DC or AC electrical windings.

More uncommon, AC linear motor work on comparative standards as rotating motor yet have their fixed and complex components organized in an orderly fashion design, creating straight movement rather than revolution. The AC motor we are using here can produced power upto 0.25hp.



Fig 4: -AC Motor

### AXLE

A axle or axletree is a focal shaft for a turning wheel or stuff. On wheeled vehicles, the axle might be fixed to the wheels, turning with them, or fixed to the vehicle, with the wheels turning around the axle. In the previous case, bearing or bushings are given at the mounting places where the axle is upheld.



Fig 5: -Axle

In the last option case, a bearing or bushing sits inside a focal opening in the wheel to permit the wheel or gear to rotate around the hub. At times, particularly on bikes, the last option type axle is alluded to as a shaft. Axles are a necessary part of most pragmatic wheeled vehicles. In a live-axle suspension framework, the axles send driving force to the wheel, as well as to keep up with the place of the wheels comparative with one another and to the vehicle body. The axles in this framework should likewise bear the heaviness of the vehicle in addition to any freight.

### WHEEL HUB

The hub of the determined wheels frequently appear to be like those of undriven ones, yet there are a few distinctions in the manner they are built in light of the fact that the determined centers need to consolidate drive screws as well. In a front-wheel-drive vehicle the hub has two positions: to drive the wheels, and to turn with the goal that the vehicle can be guided. To make this conceivable, the hub turns in or close to a huge projecting called a hub carrier. The actual carrier is mounted to the suspension with rotating conjunctures that permit it to turn and go all over.



**Fig 6: -Wheel Hub**

### PROPELLER SHAFT

A drive shaft or propeller shaft is a part for transmitting mechanical power, torque and revolution, normally used to interface different parts of a drive train that can't be associated straightforwardly due to separate or the need to take into consideration relative development between them.

As torque carriers, drive shafts are dependent upon twist and shear pressure, identical to the contrast between the input torque and the heap. They should subsequently be sufficiently able to bear the pressure, while staying away from an excessive amount of extra weight as that would thus build their latency.



**Fig 7: -Propeller Shaft**

### DRUM BRAKES

Drum brakes are used to apply brake by using frictional force. Drum brakes have brake drums that turn with the wheels. Brake shoes fitted with brake linings (rubbing material) which press against the drums from within to create slowing down force (decelerate and stop) are set within the drums.

With this framework, friction is produced by squeezing the brake linings against within surfaces of the drums. This friction converts kinetic energy into thermal energy.





**Fig 8: -Drum Brakes**

## **VI. WORKING PRINCIPLE**

The working principle of the single pedal for accelerator and brake is categorized into two different action. The first one deals with the acceleration action and the second one deals with the braking action.



**Fig 9: -Fabrication Model**



#### Acceleration action

For acceleration a pedal is pin jointed to a steel segment. By utilizing pin joint the pedal can move in clockwise and anti-clockwise. The pedal is worked utilizing the foot. Presently, a switch is welded to the steel section. This switch does the activity of on/off. This switch is interconnected to the motor. By moving the pedal in clockwise heading, the pedal presses the switch gave to the section. By squeezing it the power passes from the switch to the motor and the motor begins to rotate the wheel hub. By releasing the tension on the pedal comes to impartial position and the power is cut off from the motor.



Fig: 10- Acceleration

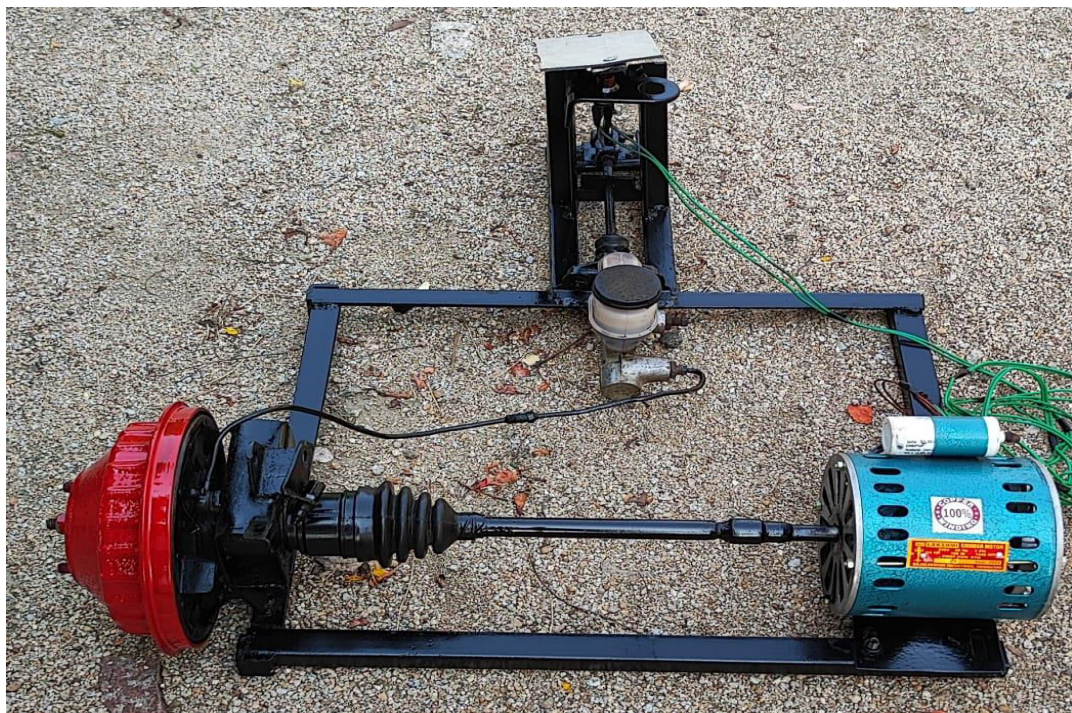


Fig: 11- Model

### Braking action

For the braking purpose a similar pedal is utilized to apply brakes. To apply brakes the push rod which is associated with master cylinder is jointed utilizing a pin joint to the edge of the model.

Presently a steel pole which is pin jointed to the edge is kept unreservedly on the pin joint of the push rod. A round bar is joined to the furthest limit of the pedal. At the point when the pedal is moved in anti-clockwise heading, the pedal pushes down the steel bar which thusly moves the push rod of master cylinder in forward bearing. At the point when the push rod moves in forward course it compresses the brake fluid inside the master cylinder. The compressed brake fluid is moved through the brake lines and shipped off the brake drum inside the wheel hub. Subsequently the brake liners are extended inside the brake drum and applies the brake to the wheel hub. By releasing the tension the brake are separated and the strain diminishes inside the master cylinder and comes to original position.



Fig: 12- Braking

### Neutral position

The neutral position is the position at which the both action acceleration and braking are not active. At this position the drivers foot remains in rest.



Fig: 13- Neutral Position

## 1. ADVANTAGES

1. In some crisis circumstances it takes more time to apply brake with isolated pedals. It would require 0.3 seconds to apply. Thus in the present circumstances the consolidated pedal would save those 0.3 second and it would add 5-8 meters to your halting distance at a speed of 75km/h.
2. It is compatible in any type of vehicle.
3. It is an simple mechanism and can be easily manufactured.
4. It is very useful for handicapped persons.

## 2. DISADVANTAGES

1. It may take sometime to adapt to it for the user who are adapted to the three pedal system.
2. It requires more force to stop the vehicle in emergency situation.

## VII. CONCLUSION

With the above study we can conclude that the new component would stay away from the disarray of the obstruction of squeezing gas pedal during applying brake. The principal objective of this new system is to lessen the accidents which are happening because of pedal blunder. Besides it is beneficial over the regular sort which is three pedal component. This component lessens response time which straightforwardly impacts the braking distance and braking time.

As step by step the utilization of vehicles are expanding and the pace of accidents are expanding as well. In this way, the circumstance demands a creative system. Thus, in this present circumstance this development would get a distinction driver's work and decrease the pace of accidents happening.

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