

## Four Wheel Leaning Suspension Vehicle

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**Abstract** - This is Four wheel leaning suspension bike which is used in hilly areas and widely used for comfort zones the name itself indicate that which is used for human comfort and which is also used for safety purpose there are so many types of Forbidden in suspension by as we know in this bike there are two suspension the suspension is on The Wheel which is shown in below diagram. there are so many connection in dad buy it and very useful for human comfort the figure shows if we are going to any hilly place the bike should not be turn around on that road

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Social science in which is used for human comfort and Sagar ambare when any bumper on the road the short will observe by the suspension which is called as a damper

Automobile industry used in very large areas and largely in automobile industry the automobile industry based on the BS4 in 2020 BF 5 engine will be run on the road

**Key Words:** Front Swing, Rear Swing, Hinges, Universal Joint, End Bearing, Plane Bearing.

### 1.INTRODUCTION

Road vehicles can expend a significant amount of energy in undesirable vertical motions that are induced by road bumps, and much of that is dissipated in conventional shock absorbers as they dampen the vertical motions. A conventional automotive shock absorber dampens suspension movement to produce a controlled action that keeps the tire firmly on the road. This is done by converting the kinetic energy into heat energy, which is then absorbed by the shock's oil.

The Power-Generating Shock Absorber (PGSA) converts this kinetic energy into electricity instead of heat through the use of a Linear Motion Electromagnetic System (LMES). The LMES uses a dense permanent magnet stack embedded in the main piston, a switchable series of stator coil windings, a rectifier, and an electronic control system to manage the varying electrical output and dampening load. The bottom shaft of the PGSA mounts to the moving suspension member and forces the magnet stack to reciprocate within the annular array of stator windings, producing alternating current electricity. That electricity is then converted into direct current through a full-wave rectifier and stored in the vehicle's batteries. The electricity generated by each PGSA can then be combined with electricity from other power generation systems (e.g. regenerative braking) and stored in the vehicle's batteries. The electric shock absorber is a device that converts the kinetic energy of an oscillating object into electric energy. This kinetic energy is normally dumped in a form of thermal energy in a conventional, mechanical shock absorber. However, only 10–16% of the available fuel energy is used to drive the vehicle, i.e. to overcome the resistance from road friction and air drag. Besides engine cycle efficiency, one important mechanism of energy loss in automobiles is the dissipation of kinetic energy during vehicle vibration and motion.

### 1.1 Objective of Study

- The main objective of this vehicle is used for leaning purposes.
- The goal of our project is to create a functioning double suspension system
- The objective is to integrate our suspension system into a vehicle that we also design.

### 1.2 Scope of Study

- The most basic consideration when choosing four wheel leaning suspension vehicles is the fluctuation you need to reach.

- The scope of this project are estimating the model and parameters of the passive system includes sprung mass and unstrung mass (spring constant of body, ski, damper coefficient, and spring constant of tire, kit) and choose the suitable model for the system by comparing the simulation and experimental results without controller.
- By using system identification technique, the parameters of the active suspension systems can be obtained and the suitable model can be chosen. Those of the aspects that is parameters and model will be used to control and achieved a good performance of the system.



**Fig-2:** Rear swing

### 1.3 Benefits from study

- The advantage of solid axles is considered the camber angle which is not affected by rolling of the vehicle body.
- produce little camber in cornering, except for that which arises from slightly greater compression of the tires on the outside of the turn.
- In addition, wheel alignment is readily maintained, which contribute to minimize tear wear.

Rear swing consist of round pipe square pipe, MS plate, plane bearing, hinges and bearing with bearing hub. The function of Rear swing used to give the flexibility in vertical direction the hinges and end plane bearing very important role in swing.

### 2.3 Power Transmutation system



**Fig-3:** Power Transmission system

## 2. CONSTRUCTIONAL FEATURES

### 2.1 Front swing



**Fig-1:** Front swing

Front swing consist of round pipe square pipe, MS plate, end bearing, hinges and bearing with bearing hub. The function of front swing used to give the flexibility in vertical as well as horizontal direction the hinges and end plane bearing very important role in swing

### 2.2 Rear Swing

Power from engine is transmitted to the one of the rear wheel of the vehicle with help of chain and sprocket mechanism, universal coupling, bearing with bearing hub the power from engine is transmit from engine shaft to the sprocket mechanism with help of chain then sprocket mechanism connected to the universal coupling due to this direction of power transmission is change. In this way power is transmitted engine shaft to the one of the rear wheel.



**Fig-4:** Steering Mechanism

In steering mechanism consist of central rod, MS plate Bearing Universal Coupling and Blocks the steel rod is connected at the canter of head of vehicle when we steer the vehicle any direction central rod give opposite direction to MS plate and vehicle goes toward desired direction.

### 3. WORKING



**Fig-1:** Working

As far as working is concern when the vehicle start power is transmitted from engine shaft to the chain sprocket with help of chain this chain sprocket is further connected to the hub and a shaft is connected to the hub which will rotated the rear wheel when there is any type off rode condition our vehicle maintained the stability and take care of comfort of the rider When any wheel subjected to irregular surface that time another wheel will try to maintained stability of hole vehicle. We can used this vehicle in hilly and remote areas As well as on rode and off condition also.

### 4. Advantages

- The advantage of solid axles is considered the camber angle which is not affected by rolling of the vehicle body.
- produce little camber in cornering, except for that which arises from slightly greater compression of the tires on the outside of the turn
- In addition, wheel alignment is readily maintained, which contribute to minimize tear wear.
- Inertia losses are less

### 5. Disadvantages

- Initial cost is high.
- Maintenance cost is more.
- Intensive care should be taken while working.

### 6. Application

- Leaning suspension vehicle is used avoid the damping effect.
- It also Minimize the shocks when driving.
- It offers comfort to the rider in off rode areas.

### 7. CONCLUSION

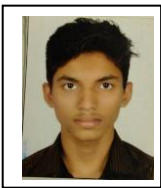
All related areas of the Four wheel leaning suspension vehicles have been covered including: selection of materials, various links, tilting mechanisms & fabrication of all linkages for better and smooth working.

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