SMART SHOCK ABSORBER

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ABSTRACT

A shock absorber is a mechanical device designed to smooth out or (A slight wetness) damp a sudden shock impulse and dissipate kinetic energy. In a vehicle, it reduces the effect of travelling over rough ground. Without shock absorbers, the vehicle would have a bouncing ride, as energy is stored in the spring and then released to the vehicle, possibly exceeding the allowed range of suspension movement. Control of excessive suspension movement without shock absorption requires stiffer (higher rate) springs, which would in turn give a harsh ride. Shock absorbers allow the use of soft (lower rate) springs while controlling the rate of suspension movement in response to bumps.

KEYWORDS: Regenerative shock absorber; vibration energy; recovery potential; structure; modeling method

I. INTRODUCTION

The sole purpose of this project is to improvise the existing suspension system by replacing the present shock absorbers with magnets. The present shock absorbers consist of incompressible fluid which converts the kinetic energy in to heat energy and dissipated. As every the division are in contact with every other even though it is damping unexpected shocks, due to express contact these vibrations are transferred. Several of the difficulties of the present shock absorbers are:

1) Damage of the vehicle mechanism owing to vibrations.
2) Failure of part due to unexpected shocks.
3) Discomfort for passengers due to vibrations.
4) Floor damage in container of machines due to vibrations.

If we investigate the drawbacks of the present shock absorbers, every the above troubles can be decide by simply eliminate the contact amongst the wheels and framework of the vehicle. Therefore as a student of mechanical engineering this project will expose me to the field of designing and allows me to study the detailed properties of magnets. In this development in order to raise the upper part of the body from the subordinate one, magnets are used. These electro magnets are positioned in such a way that similar poles are located on the same side so that the keep away each other and as the instant in horizontal bearing is constrained it create affecting up lifting up the body of the vehicle.

Theoretical background of suspension system is given in aspect so as to construct conscious of present generation suspension scheme, and the components of the suspension organization. Methodology includes various case studies we made; they also include different attempts we complete to augment the magnetic strength of the magnets. Fabrication of suspension organization is the place where suggest of the illustration is made. A prototype is a simple replica of the shock absorber that we made using the concept of magnets. Results and discussions include different consequences that we got during several case studies. Graphs were plotted based on those results. Advantages and disadvantages are the next topic of the report. It explains how our scheme overcomes the disadvantage of the nearby shock absorbers. Conclusion is made by generous an overview on the project pursue by a conversation on prospect scope of the project. Bibliography is complete

in order to tell, what were the journals and books that we referred earlier than jumping into conclusions.

II. Suspension system

Suspension is the collection of tire, tire air, springs, shock absorbers and linkage that secure a vehicle to its wheels and agree to relative motion concerning the two. Suspension systems provide a dual principle contributory to the vehicle's road holding/handling and brake for good quality energetic protection and energetic pleasure, and preservation vehicle occupants relaxed and a journey quality rationally glowing inaccessible from road noise, bumps, vibrations, etc

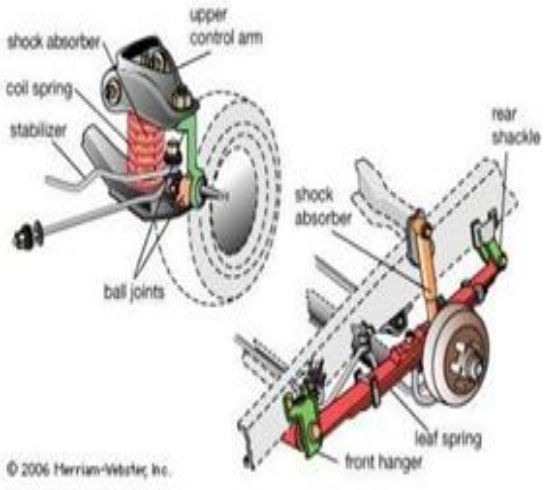

Fig 1 Suspension system

These goals are normally at odds, so the tuning of suspensions involves judgment the right compromise. It is significant for the suspension to continue the road wheel in contact with the road surface as much as probable; since all the road or ground forces performing on the vehicle do so through the contact territory of the tire. The suspension also defend the vehicle itself and numerous cargo or luggage from injure and wear. The design of front and rear suspension of a car might be dissimilar.

III. Interconnected suspension

Organized deferral, unlike semi active suspensions, could easily decouple different vehicle vibration modes in a passive manner. The interconnections can be realized by a variety of means, such as involuntary, hydraulic and pneumatic. Anti roll bars are one of the characteristic examples of perfunctory interconnections, while it has been stated that fluidic interconnections offer greater potential and flexibility in improving both the stiffness and damping properties.

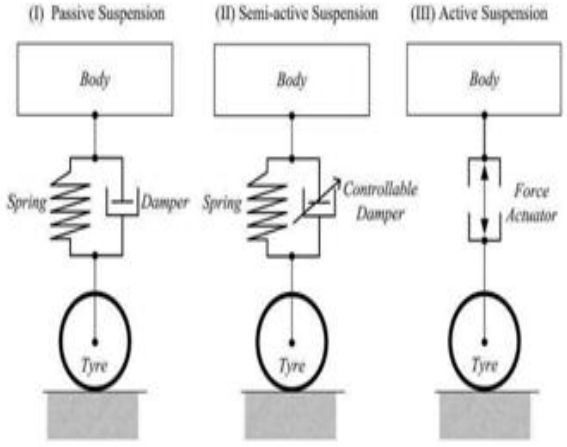

Fig 6 Inter connected suspension system

IV. BLOCK DIAGRAM

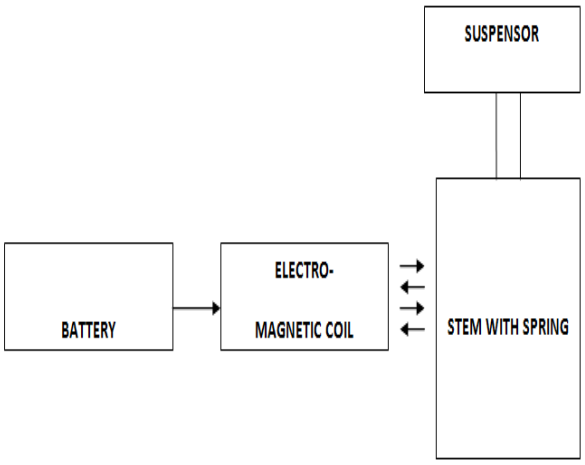

Fig Block diagram

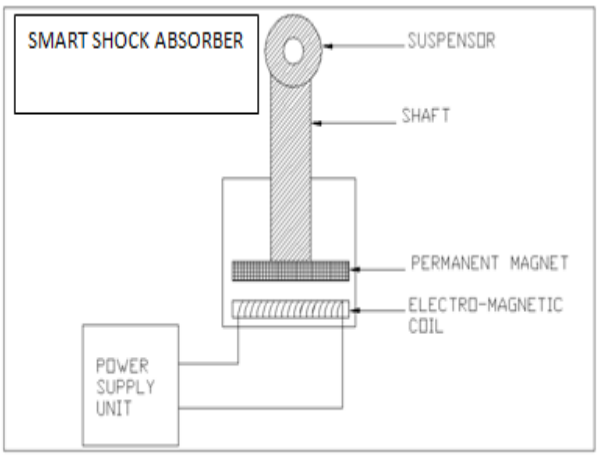

Fig Workflow diagram

V. SHOCK ABSORBER

A shock absorber is a perfunctory or hydraulic machine intended to soak up and damp shock impulses. It does this by converting the kinetic energy of the upset into another form of energy typically heat which is then dissipated. A shock absorber is a type of dashpot. Pneumatic and hydraulic shock absorbers are used in conjunctio n with cushion and springs. An automobile shock absorber contain spring- encumbered ensure valves and orifices to control the flow of oil through an internal piston.

One design deliberation, when scheming or choosing a shock absorber, is where that energy will go. In most shock absorbers, liveliness is transformed to heat inside the viscous fluid. In hydraulic cylinders, the hydraulic fluid heats up, while in air cylinders, the hot air is usually exhausted to the atmosphere. In other types of shock absorbers, such as magnetic types, the dissipated energy can be stored and used later. In universal terms, shock absorbers help mitigate vehicles on uneven roads.

Dampers or shock absorbers

The upset absorbers damp out the motions of a means of transportation up and down on its springs. They also necessity damp out a great deal of the wheel rebound when the unsprung weight of a wheel, hub, axle and sometimes brakes and differential bounces up and down on the springiness of a tire. Some have optional that the standard bumps found on dirt are caused by this wheel bounce, though some evidence exists that it is unconnected to deferment at all.

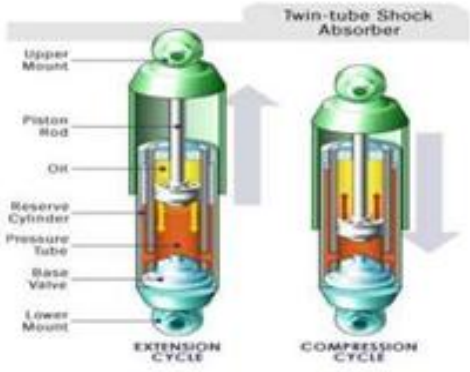

Fig 4 Passive suspension system.

METHODOLOGY

When a conducting wire is wounded just about a metal rod and in progress is allowed to pass through them, magnetic flux is generated across the windings and this each winding acts as a piece of magnet. These when aligned very closely they induce current into the rod, thereby making the rod a magnet. These magnets execute the similar properties as that of permanent magnets. Now we know that similar poles of a magnet repel each other the same principle is used in making the magnetic suspension system. Theoretical approach of the project starts from the following formula: -An electric current flowing in a wire creates a magnetic field around the wire, due to Amperes law. To concentrate the magnetic field, in a magnet the wire is wound into a coil with many turns of wire lying side by side.

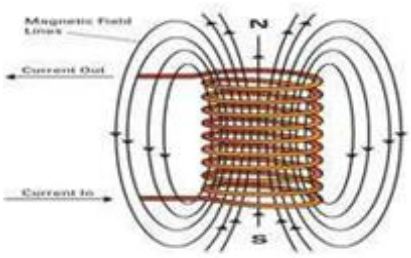

Fig Magnet

The compelling field of all the turns of wire passes from side to side the centre of the coil, creating a strong compelling field there. A coil forming the shape of a directly tube is called a solenoid. The bearing of the compelling field during a coil of wire can be found from a form of the right hand rule. If the fingers of the right hand are bowed roughly the coil in the direction of current flow through the windings, the thumb points in the direction of the field inside the coil. The side of the inducement that the meadow lines emerge from is defined to be the North Pole. From the above formula we can theoretically calculate the magnetic power of the magnets. However impending to real life applications numerous wounded will take place such as Eddy current losses etc. The mechanism is mounted in between two magnets to avoid impact of magnets. The outer distance of mechanism can be selected considering the clearance between casing diameter and spring which avoid jam of spring.

VI. Dependent system

A dependent suspension normally has a beam a simple 'cart' axle or driven live axle that holds wheels parallel to each other and perpendicular to the axle. When the camber of one wheel changes, the camber of the opposite wheel changes in the same way by convention on one side this is a positive change in camber and on the other side this a negative change. In a front engine, rear-drive vehicle, dependent rear suspension is either "live axle" or deDion axle, depending on whether or not the differential is carried on the axle.

Because it assures constant camber, dependent and semi- independent suspension is most common on vehicles that need to carry large loads as a proportion of the vehicle weight, that have relatively soft springs and that do not for cost and simplicity reasons use active suspensions. The use of dependent front suspension has become limited to heavier commercial vehicles.

VII. Independent system

An independent suspension allows wheels to rise and fall on their own without affecting the opposite wheel. Suspensions with other devices, such as sway bars that link the wheels in some way are still classed as independent.

Transverse leaf springs when used as a suspension link or four quarter elliptic on one end of a car are similar to wishbones in geometry, but are more compliant. Examples are the front of the original Fiat 500 and the early examples of Peugeot 403 and the back of the AC Ace.

Because the wheels are not constrained to remain perpendicular to a flat road surface in turning, braking and varying load conditions, control of the wheel camber is an important issue. Swinging arm was common in small cars that were sprung softly and could carry large loads, because the camber is independent of load. Some active and semi-active suspensions maintain the ride height, and therefore the camber, independent of load. In sports cars, optimal camber change when turning is more important.

VIII. Semi independent

A third type is a semi-dependent suspension. In this case, the movement of one control does influence the location of the other but they are not rigidly attached to each other. A twist-beam rear suspension is such a system. In semi sovereign suspension, the

wheels of an axle are able to move relation to one another as in a self governing suspension but the position of one wheel has an effect on the location and approach of the extra sweep. This consequence is achieved via the slanting or deflecting of deferment parts under load. The most ordinary type of semi autonomous deferral is the twist beam.

The twist beam rear deferment also torsion sunbeam axle or deformable torsion sunbeam is a type of automobile suspension based on a large H or C shaped member. The front of the H attaches to the cadaver via rubber bushings, and the rear of the H carries each stub axle assembly, on each side of the car. The cross beam of the H holds the two straggling arms together, and provides the roll inflexibility of the deferral, by twisting as the two irregular arms move vertically, relative to each other.

IX. Magnetic suspension

Magnetic suspension is the attractive levitation of an entity achieve by constantly altering the strength of a magnetic field shaped by magnets using advice loop. In most cases the levitation effect is mostly due to enduring magnets as they don't have any authority indulgence, with magnets only used to stabilize the effect

In these kinds of fields an unstable equilibrium condition exists. Although static fields cannot give steadiness, Electromagnetic suspensions works by repeatedly altering the current sent to magnets to change the might of the compelling field and allows a stable levitation to occur. In Electromagnetic suspensions a feedback loop which continuously adjusts one or more magnets to correct the object's motion is used to cancel the instability. Many systems use gorgeous charisma pulling upwards beside implication for these kinds of systems as this gives some intrinsic imaginative stability, but some use a grouping of compelling draw and magnetic revulsion to push upwards.

Magnetic levitation expertise is imperative because it reduces energy utilization, largely obviating friction. It also avoids wear and has very low maintenance requirements. The request of compelling levitation is most usually known for its role in Maglev trains.

CONCLUSION

The proposed design is not only made for improvisation but it also focuses on different aspects like Safety, Ride comfort, Fail Safe etc., each of them is explained below. In general, the make contact with with road exterior is augmented. When a car turns through corner of curves, the effect of body roll is almost eliminated. This would decrease the chance to topple over the sides making it safer for the passenger. Also the horizontal association of the means of transportation would avoid injure of the mechanical parts.

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