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DESIGN AND DEVELOPMENT OF AUTOMATIC GROUND CLEARANCE SYSTEM

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Abstract: The treatment of vehicle relies on the different parameters; focus of gravity of the vehicle is one of them. For better treatment of the vehicle we have to keep focus of gravity as low as could reasonably be expected. For sport vehicles it is constantly kept low yet for the traveller vehicles it bargains with its ground leeway. The architects want to keep up fixed ground leeway and plan the framework to secure essential suspension parameters. For various sort of tracks, the ground freedom of vehicle is structured as needs be and that is the reason this is an unobtrusive explanation which likewise separates the vehicles as on- street (Sedan/Hatchback vehicles) and rough terrain (Sports utility vehicles (SUV)). Rough terrain vehicles need to confront the unpleasant territory, where we need the high ground freedom of the vehicle; then again we run a similar vehicle on a street where high ground leeway isn't fundamental. Though a car vehicle or hatchback needs to run on smooth streets just as on harsh landscapes at some point with its fixed lower ground leeway which will in general make scratches on the base segment of the vehicle. In the two cases we need a customizable ground freedom framework in the vehicle to have ideal execution. Here this paper presents the pneumatic lifting method which is utilized to give the higher ground leeway at the hour of unpleasant streets/breakers and lower the equivalent to get appropriate ground freedom to keep up the solidness at fast on smooth streets.

The 3D model will be drawn with the assistance of CATIA programming. All the parts will be then chosen and afterward the get together of the considerable number of segments will be completed. In the wake of making the get together, the testing of set up will be completed and afterward the outcome and end will be drawn.

Keywords: *Sports Utility Vehicle, Sedan, Hatchback*

I INTRODUCTION

Street conditions are not comparable at all spots; it changes with application, condition and atmosphere. In city at various divisions like school, emergency clinic there is speed breakers of various measurements. At certain condition street goes straight with no pits else we discovered anomaly. The vast majority of the individuals purchase just a single four wheeler which they utilize that at this condition. Thus it's important to give some standard ground leeway to the vehicle. Yet at the same time there is some block while driving the vehicle on thruway and in city. It isn't feasible for the rough terrain vehicle to run at rapid on its standard ground freedom gave thinking about the city hindrances and on-street vehicles to run over the unpleasant landscape with its lower ground leeway. To get the great execution at rapid and low speed it is important to assemble one framework which can differ the ground leeway. This can accomplish by changing the suspension tallness so the case stature can be balanced as for the speed and the nature of streets. Suspension frameworks assumes fundamental job while planning the vehicle for good dependability and street holding capacity.

Figure 1: Hatchback car (on road vehicle)

It is hard to accomplish this capacity at all street condition with aloof suspension framework as it were. This issue can be understood by dynamic suspension framework yet this isn't broadly utilized on the grounds that it required progressively outside vitality and extra controlling framework which influences the expense of the vehicle. So as to lessen the unpredictability and the expense while improving ride, dealing with and execution we can utilize the mix of dynamic and latent suspension framework. In this paper different parameters are talked about which are identified with the ground leeway and suspension framework and its control. This gives the thought regarding the vehicle attributes like ride control, tallness control, move control, street holding and so on and its impact on vehicle execution. Ground freedom is the situation of the vehicle body (sprung mass) over the fundamental ground level. It is a significant parameter in rough terrain vehicle.

For a specific vehicle's weight, there is a sure measure of mechanical down power which follow up on tires, and in this way the grasp of tires is continually changing during running condition. The entire load of vehicle is gathered at a point known as focus of gravity. At the lower ground leeway, we get the area of focal point of gravity close to the ground level. This decreases weight move during cornering, quickening, and slowing down and increment the vehicle execution. Additionally, by bringing down the front end and raising the backside, we can improve rapid strength. Since the focal point of gravity has an effect on a large portion of the parameters during running of the vehicle. We need an area of focal point of gravity at a significant level just as at lower level as indicated by street conditions. We have planned a straightforward pneumatic linkage instrument for ground freedom modification. The alteration is conceivable with the assistance of a functioning and a uninvolved suspension which are connected together in arrangement. Dynamic suspension is set beneath the aloof suspension. With the assistance of this framework we can change ground freedom of the vehicle up to 200mm. Pneumatic chambers are mechanical gadgets which utilize the intensity of packed gas to deliver a power in a responding direct movement. Like in pressure driven chambers, something powers a cylinder to move in the ideal bearing. In this way it creates a lift wanted way. Air blower is used to deliver a pneumatic lift to build the ground leeway at whatever point required else it brings the undercarriage down to its situation to have standard ground freedom by going about as a functioning suspension framework.

Figure 2: Jeep Wrangler (off road vehicle)

In city at various divisions like school, emergency clinic there are speed breakers of various measurements. The greater part of the individuals purchase just a single four wheeler which they utilize that at this condition. Consequently it's important to give some standard ground freedom to the vehicle. Yet at the same time there are a few blocks while driving the vehicle on roadway and in city. To acquire the great execution at rapid and low speed it is important to manufacture one framework which can change the ground leeway. This can accomplish by changing the suspension tallness so the body stature can be balanced as for the speed and the nature of streets. We have planned a basic pneumatic linkage instrument for

ground freedom alteration. The change is conceivable with the assistance of a functioning and a uninvolved suspension which are connected together in arrangement. Dynamic suspension is set beneath the inactive suspension. With the assistance of this framework we can differ ground freedom of the vehicle up to 200mm.

We have planned a straightforward pneumatic linkage system for ground freedom alteration. The alteration is conceivable with the assistance of a functioning and an aloof suspension which are connected together in arrangement. Dynamic suspension is put underneath the aloof suspension. With the assistance of this framework we can change ground freedom of the vehicle. Pneumatic chambers are mechanical gadgets which utilize the intensity of compacted gas to deliver a power in a responding straight movement. Because of the trouble of working vehicle jacks, different types of electric jacks have been proffered. With the advancement of such electric jacks has slowly come a comprehension of a portion of the issues related therewith. Because of the torque expected to lift something as substantial as most vehicles, as an extreme mechanical bit of leeway must be used. Jacks that are incorporated with a car have not been acknowledged because of cost and the need to at any rate lift each side of an auto, if not all corners exclusively. To diminish the human exertion for working any sort of jack independently. This will most fittingly profit senior residents to give a sheltered and straightforward programmed pneumatic jacking framework without manual exertion. To give a novel jacking framework that can be worked from inside the vehicle by methods for a valve control. There are sure instruments effectively accessible for a similar reason which has a distinct ability to lift the vehicle wheels viz. Ground leeway is the situation of the vehicle body (sprung mass) over the essential ground level. It is a significant parameter in rough terrain vehicle. For a specific vehicle's weight, there is a sure measure of mechanical down power which follows up on tires, and along these lines the hold of tires is continually changing during running condition. The entire load of vehicle is assembled at a point known as focus of gravity. At the lower ground leeway, we get the area of focus of gravity close to the ground level. This diminishes weight move during cornering, quickening, and slowing down and increment the vehicle execution. Additionally, by bringing down the front end and raising the backside, we can improve fast dependability. Since the focal point of gravity has an impact on a large portion of the parameters during running of the vehicle. We need an area of focal point of gravity at a significant level just as at lower level as per street conditions. We have structured a straightforward pneumatic linkage instrument for ground leeway alteration. The alteration is conceivable with the assistance of a functioning and a uninvolved suspension which are connected together in arrangement. Dynamic suspension is put underneath the inactive suspension. With the assistance of this framework we can differ ground leeway of the vehicle up to 200mm. Pneumatic chambers are mechanical gadgets which utilize the intensity of packed gas to create a power in a responding direct movement. Like in water driven chambers, something powers a cylinder to move in the ideal bearing. Along these lines it delivers a lift wanted way. Air blower is used to deliver a pneumatic lift to build the ground freedom at whatever point required else it brings the frame down to its situation to have standard ground leeway by going about as a functioning suspension framework.

Ground clearance techniques

Assisters for coil springs

Figure 3: Assisters for coil springs.

An assister is fairly similar to a spacer that fits into a curl spring. Basically, it is a bit of wound polyurethane that will sit in the middle of the loops of a curl spring suspension. The assister demonstrations by constraining the suspension travel to a degree. At the

point when suspension travel is constrained, the vehicle won't hit rock bottom on speed breakers and potholes, and consequently spare itself from scratching. Essentially, the ground freedom is helped by 10-15 mm by this alteration, which is typically enough for low threw vehicles to get by without scratching. The assister can be set in 3 distinct situations on a loop springs. Each position delivers a somewhat extraordinary impact. At the point when put at the highest point of the curl, it acts at all heaps. At the point when put in the center, the assister gets without hesitation under.

Problem Statement

Higher ground freedom quite often implies the vehicle has a generally higher focal point of gravity. As a rule, this will in general inadequately influence taking care of, on the grounds that it makes a bigger second about a hub on the ground plane. In the event that their ground freedoms high, at that point it impact on motor productivity causes less efficiency. For lower ground freedom vehicle, it's passed from on any snag then it effortlessly scratched.

Objectives

1. To design and fabricate automatic ground clearance adjustment.
2. To make system is very user friendly.
3. The automatic in built pneumatic system is used to lift the chassis from the ground without human efforts and time.
4. Pneumatic lifting technique system is used to provide higher ground clearance at the time of rough roads and speed bumps.
5. To cope up the shortage of most commonly used fuel and go for compressed air as a working medium.
6. To lift the vehicle very smoothly without any impact force.

Methodology

Step 1: - We started the work of this project with literature survey. We gathered many research papers which are relevant to this topic. After going through these papers, we learnt about Fatigue Testing Machine.

Step 2: - After that the components which are required for our project are decided.

Step 3: - After deciding the components, the 3 D Model and drafting will be done with the help of CATIA software.

Step 4: - The components will be manufactured and then assembled together.

Step 5: - The experimental observations will be taken, calculations will be done and then the result will be concluded

Block Diagram:

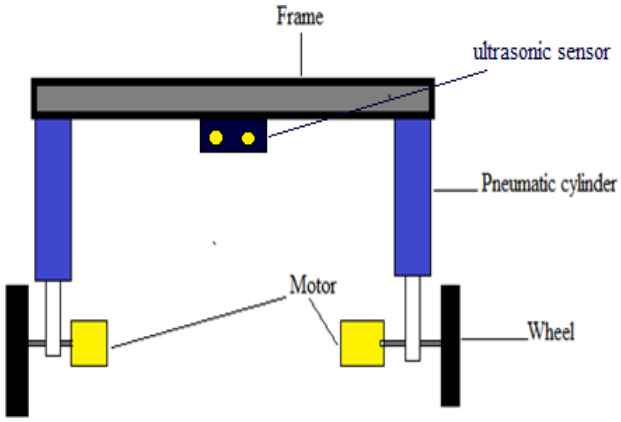

Figure 4: Block Diagram

II LITERATURE SURVEY

[1]"Adjustable Ground Clearance in Vehicles Using Pneumatic Lifting" by Ghanshyam Baghel, Prince Jaiswal, Prashant Dewangan, Abhishek Parsend, Devesh Shrivastava

The treatment of vehicle relies on the different parameters; focus of gravity of the vehicle is one of them. For better treatment of the vehicle we have to keep focal point of gravity as low as could be expected under the circumstances. For sport vehicles it is constantly kept low however for the traveler vehicles it bargains with its ground leeway. The planners like to keep up fixed ground freedom and structure the framework to obtain imperative suspension parameters. For various kind of tracks, the ground leeway of vehicle is structured appropriately and that is the reason this is an unpretentious explanation which additionally separates the vehicles as on-street (Sedan/Hatchback vehicles) and rough terrain (Sports utility vehicles (SUV)). Rough terrain vehicles need to

confront the unpleasant landscape, where we need the high ground freedom of the vehicle; then again we run a similar vehicle on a street where high ground leeway isn't essential. While a car vehicle or hatchback needs to run on smooth streets just as on harsh territories at some point with its fixed lower ground freedom which will in general make marks on the base part of the vehicle. In the two cases we need a customizable ground freedom framework in the vehicle to have ideal execution. Here this paper presents the pneumatic lifting method which is utilized to give the higher ground freedom at the hour of unpleasant streets/breakers and lower the equivalent to get appropriate ground leeway to keep up the dependability at rapid on smooth streets.

This advancement can assist driver with choosing the ground leeway with his solace of driving as indicated by territory. Heading out street gets simpler and vehicle can eco- friendly by bringing down ground leeway while driving on street. For the rough terrain tracks, one can have most elevated freedom and move along the course of the street with better taking care of. On other hand for on street tracks, by bringing down ground leeway we can appreciate the delight of being in an on-street vehicle. This framework helps in under guiding of the vehicle. The framework is very easy to use. This framework will build the economy of a vehicle. The outcomes in expanded multifaceted nature. The framework demonstrates that the Adjustable Ground Clearance Mechanism is a decent imaginative framework for better execution of rough terrain vehicles. Since the framework is easier to use and simultaneously increment the exhibition, this will have great market potential. The ground freedom can be handily balanced by the driver itself at wherever. The framework is especially dependable in activity.

[2]"Development of Advanced Pneumatic Lifting and Ground Clearance Technique in Car" by Jagadeesh H, Navinesh B C

Creator reasoned that the pneumatics jacks can act in the spot of water driven jacks effectively. The air required for the working of the jack is effectively accessible in the nature. Cost of the task isn't high contrasted and different jacks. As our jack is in constructed the exhaustion is less. Whenever made in the part the expense could be less. It serves better than water driven jacks which is utilized for lifting. With the end goal that interruption driving is a significant supporter of mishap passing, accordingly by actualizing this System we can decreased the nearby effect potential mishap. This development would help the ladies seniors and other individual people to handily replace the tires. It would spare time of introducing a manual jack and washing of the lower body of the vehicle as it would raise the vehicle by around 2 feet. To limit human exertion.

In city at various parts like school, medical clinic there are speed breakers of various measurements. The greater part of the individuals purchase just a single four wheeler which they utilize that at this condition. Subsequently it's important to give some standard ground freedom to the vehicle. Yet at the same time there are a few impediments while driving the vehicle on roadway and in city. To get the great execution at fast and low speed it is important to fabricate one framework which can change the ground freedom. This can accomplish by changing the suspension stature so the case tallness can be balanced concerning the speed and the nature of streets. We have planned a straightforward pneumatic linkage instrument for ground freedom alteration.

The alteration is conceivable with the assistance of a functioning and a detached suspension which are connected together in arrangement. Dynamic suspension is put beneath the inactive suspension. With the assistance of this framework we can change ground leeway of the vehicle up to 200mm. We have structured a basic pneumatic linkage component for ground freedom alteration. The alteration is conceivable with the assistance of a functioning and an inactive suspension which are connected together in arrangement. Dynamic suspension is put underneath the latent suspension. With the assistance of this framework we can differ ground freedom of the vehicle. Pneumatic chambers are mechanical gadgets which utilize the intensity of packed gas to deliver a power in a responding direct movement.

The pneumatics jacks can act in the spot of water powered jacks productively. The air required for the working of the jack is effectively accessible in the nature. Cost of the task isn't high contrasted and different jacks. As our jack is in assembled the

weakness is less. Whenever made in the parcel the expense could be less.

[3]"DESIGN AND DEVELOPMENT OF AUTOMATIC PNEUMATIC BUMPER SYSTEM" by PROF. M. B. BANKAR, PROF. S. K. PAWAR, PROF. R. V. LALGE

In Design and improvement of programmed pneumatic guard framework said that the programmed pneumatic guard framework to lessen the harm for vehicles. To accomplish this framework alteration objective he utilizes IR sensor to distinguish the hindrances close to it. India is the biggest nation in the utilization of different kinds of vehicles. As the accessible assets to run these vehicles like nature of streets, and inaccessibility of new advancements in vehicles are foundations for mishaps. Despite the fact that there are various foundations for these mishaps yet legitimate innovation of stopping mechanism and innovation to decrease the harm during mishap are mostly consequences for the mishap rates. So today usage of legitimate slowing mechanism to forestall the mishaps and pneumatic guard framework to diminish the harm is must for vehicles. To accomplish this framework alteration objective, structure this "Programmed Pneumatic Bumper framework". The work is a decent answer for connect the doors among organization and ventures and ready to comprehend the troubles in keeping up the resiliences and furthermore quality.

Today India is the most significant immature nation on the planet. India is the biggest nation in the utilization of different sorts of vehicles. As the accessible assets to run these vehicles like nature of streets, and inaccessibility of new innovations in vehicles are foundations for mishaps. The quantity of people groups which are dead during the vehicle mishaps is additionally extremely enormous when contrasted with different reasons for death.

In spite of the fact that there are various reasons for these mishaps yet appropriate innovation of slowing mechanism and innovation to decrease the harm during mishap are primarily impacts on the mishap rates. So today usage of legitimate slowing mechanism to forestall the mishaps and pneumatic guard framework to decrease the harm is must for vehicles. To accomplish this framework change objective, plan this "Programmed Pneumatic Bumper framework".

This undertaking work has given us a fantastic chance and experience, to utilize our constrained information. We increased a great deal of handy information in regards to, arranging, buying, amassing and machining while at the same time accomplishing this venture work. We feel that the task work is a decent answer for connect the entryways among establishment and businesses. We can comprehend the challenges in keeping up the resistances and furthermore quality. We have done to our capacity and ability utilizing accessible offices.

[4] "Adjustable Ground Clearance System by using Gear and Tooth Mechanism" by Kumar Mayank Diwanshu Sharma

In Adjustable Ground Clearance System by utilizing Gear and Tooth Mechanism said that structured a basic mechanical linkage instrument for ground freedom modification. The modification is conceivable at hang conditions with the assistance of little rigging. With the assistance of this framework we can fluctuate ground leeway of the vehicle up to 180mm. Suspension is one of the most moving frameworks to plan for rough terrain vehicle. Appropriate suspension instrument and individual. Parameters are significant for rough terrain vehicles. The suspension configuration ought to be versatile to changing street conditions. The planners like to keep up fixed ground freedom and structure the framework to gain good suspension parameters. The rough terrain vehicle ought not be dealt with a similar way. Suspension is the arrangement of tires, tire air, springs, safeguards and linkages that associates a vehicle to its haggles relative movement between the two. Suspension frameworks must help the two streets holding/taking care of and ride quality, which are at chances with one another. The tuning of suspensions includes finding the correct trade off. It is significant for the suspension to keep the street wheel in contact with the street surface however much as could be expected, in light of the fact that all the street or ground powers following up on the vehicle do as such through the contact patches of the tires. The suspension additionally ensures the vehicle itself and any freight or baggage from harm and wear. The structure of front and back suspension of a vehicle might be unique. During running state of vehicles, area of the focal point of

gravity (C.G) is likewise a significant parameter. For better treatment of the vehicle we have to keep C.G point as low as could be expected under the circumstances. This is conceivable by altering the ground leeway of the vehicle. Subsequently, I use the idea of Adjustable Ground Clearance Mechanism which will demonstrate gainful impact to the rough terrain vehicles to alter the ground freedom as indicated by landscape.

Ground freedom is the situation of the vehicle body (sprung mass) over the fundamental ground level. It's a significant parameter in rough terrain vehicle. For a specific vehicle's weight, there is a sure measure of mechanical down power follow up on tires, and in this manner the grasp of tires is continually changing during running condition. The entire load of vehicle is accumulated at a point known as a focal point of gravity point.

The framework demonstrates that the Adjustable Ground Clearance Mechanism is a decent creative framework for better execution of rough terrain vehicles. Since the framework is more clients agreeable and simultaneously increment the effectiveness of execution, this will have great market potential.

CATIA MODEL

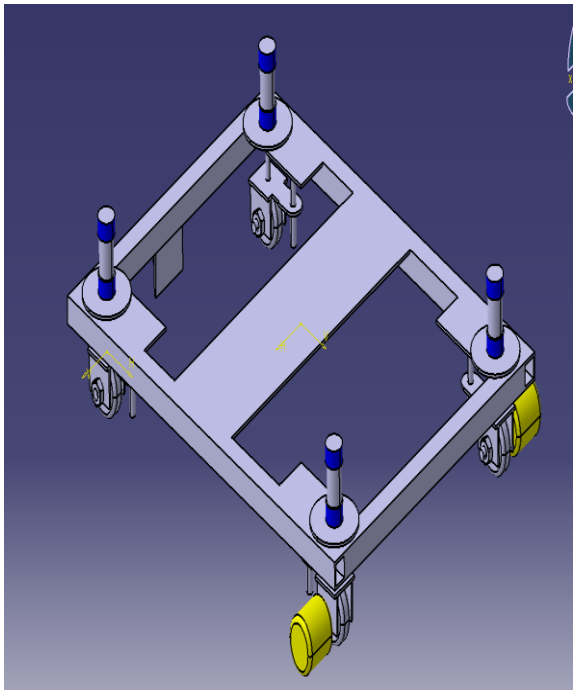

Figure 5 :- CATIA Design

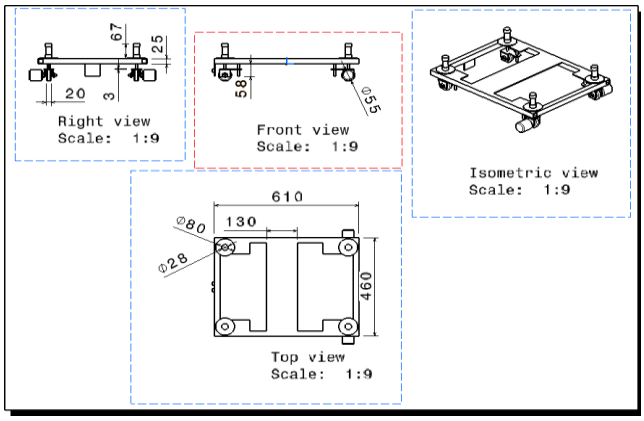

Figure 6 :-Drafting of Model

III WORKING

Our entire framework is mounted on outline which is move with the assistance of wheels. Toward the front of the framework there is sensor. We take ultrasonic sensor here. These sensors sense the article before outline. Ultrasonic sensor utilizes transducer and beneficiary to send and get single. When there is an item before the framework, our framework is lift. This lift happens with the assistance of pneumatic chamber. Ultrasonic sensor offers single to pneumatic chamber and casing lift upward way. As the article die pneumatic chamber goes down.

IV FUTURE SCOPE

No project is ever complete with respect to the technology it uses. There is constant improvement in the technology that drives it. So we have to consider an aspect which needs to be considered to accommodate future probabilities in our project.

1)We can integrate this system in military vehicles that need to travel on off roads quite often.

2)We integrate this system with medical vehicles that need to follow social distancing in the current Covid-19 Pandemic.

3)This system traces its use in various construction vehicles which are peculiarly subjected to rough roads and cause many accidents due to obstacle hitting.

4)The low ground clearance vehicles can have this system to counter bumpers or speed breaker to ensure that vehicle does not get damaged on the chassis.

5)This system can briefly be used on rovers that are sent on other planets like mars rover so that it can operate on clingy roads.

V CONCLUSION

1) We have concluded that this project model can be heavily commercialized in various industries.
2) We can use this model in accident prevention of private and commercial vehicles basically the four wheelers.
3) We can conclude that this type of mechanism is very essential in current scenarios where the roads are heavily flowing with mixed traffic keeping safe distance between two vehicles.
4) We can conclude that this mechanism can be useful for off-road vehicles for better obstacle prevention.

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