

Design and Development of Automatic Ground Clearance Adjustment System

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ABSTRACT

The treatment of a vehicle depends on the various parameters; the vehicle's gravity focus is one amongst them. To raised treat the vehicle, we've got to stay the main target of gravity as low as attainable. It's perpetually unbroken low for sports vehicles for the individual vehicles it bargains with its ground leeway. The architects need to stay up fastened ground leeway and arrange the framework to secure essential suspension parameters. For varied varieties of tracks, the bottom freedom of the vehicle is structured as desires be which is that the reason this is often associate with unobtrusive clarification that likewise separates the vehicles as on-street (Sedan or Hatchback vehicles) and rough parcel of land (sports utility vehicles (SUV)). Cross-country vehicles ought to face the rough parcel of land, wherever we'd like the status clearance of the vehicle, on the opposite hand, we tend to run a similar vehicle on a road wherever status clearance isn't necessary. Whereas a sedan automobile or hatchback should run on sleek roads similarly as on rough terrains typically with its fastened lower ground clearance that tends to make dents on the all-time low portion of the automobile. Within the 2 cases, we'd like a customizable ground freedom framework within the vehicle to possess ideal execution. Here this paper presents the gas lifting technique that is employed to relinquish the upper ground leeway at the hour of unpleasant streets/breakers and lower the reminiscent of getting acceptable ground freedom to stay up the solidness as quick on sleek streets. With the assistance of CATIA programming, the 3D model will be drawn. 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, ground clearance.

INTRODUCTION

Street conditions are not kindred at all spots; it changes with different applications like environment and atmosphere. In the city at various divisions like school, emergency clinic there are speed breakers of various measurements. At certain conditions street goes straight with no pits else we discovered an 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 the thruway and in the city. It isn't feasible for the rough terrain vehicle to run at expeditious on its standard ground liberation gave contemplating the city obstructions and on-street vehicle to run over the unpleasant landscape with its lower ground clearance. To get the great execution at expeditious and low speed it is consequential to

assemble one framework which can differ the ground clearance. This can accomplish by transmuting the suspension tallness so the case stature can be balanced as for the haste and the nature of streets. Suspension

frameworks surmise fundamental jobs while orchestrating the conveyance for good dependability and street holding capacity. The Hatchback car is shown in Figure1.



Fig.1:-Hatchback car (on road vehicle)

It is arduous to accomplish this capability associate degrees respect street conditions with a reserved suspension framework because it was. This issue may be understood by the dynamic suspension framework however this is not loosely used as a result of it needed increasingly outside vitality and further dominant framework that influences the expense of the conveyance. To abate the capriciousness and therefore the expense whereas amending ride, managing, and execution we are able to utilize the cumulation of dynamic and latent suspension framework. During this paper, completely different parameters square measure spoken regarding that square measure known with the bottom leeway and suspension framework and its management. This provides the rationale conception concerning the conveyance attributes like ride management, tallness management, motion management, street holding, and then on and their impact on vehicle execution. Ground liberation is that the scenario of the conveyance body (sprung mass) over the elemental ground level. It's an important parameter in rough parcel of land vehicles.

For an exact car's weight, there's an exact quantity of mechanical down force that acts on tires, and so the grip of tires is consistently ever-changing throughout the running condition. A complete load of the vehicle is gathered at some extent referred to as the main target of gravity. At the lower ground leeway, we have a tendency to get the realm of a concentration of gravity on the point of the bottom level. These decreases weight move throughout cornering, quickening, and deceleration down and increment the vehicle execution. To boot, by transfer down the forepart and raising the backside, we are able to improve fast strength. Since the concentration of gravity has an impact on an oversized portion of the parameters throughout the running of the vehicle. We'd like a neighbourhood of a concentration of gravity at a major level even as at a lower level as indicated by street conditions. We've got planned a simple pneumatic linkage instrument for a ground freedom modification. The alteration is conceivable with the help of a functioning and an uninvolved suspension that area unit connected along in an arrangement. Dynamic suspension is ready

at a lower place the distant suspension. With the help of this framework we will modification ground freedom of the vehicle up to 200mm. gas chambers area unit mechanical gadgets that utilize the intensity of packed gas to deliver an influence during responding direct movement. Like in pressure-driven chambers, one thing powers a cylinder to manoeuvre within the ideal bearing during

this method it creates a carry wished method. Air blower is employed to distribute a gas hoist to make the bottom leeway at no matter purpose needed else it brings the support right down to its scenario to possess normal ground liberation by going concerning as a functioning suspension framework. Jeep Wrangler (off road vehicle) is shown in Figure 2.



Fig.2:-Jeep Wrangler (off road vehicle)

In city at different divisions like school, emergency clinic there are speed breakers of sundry quantifications. The more preponderant part of the individuals purchase just a single four wheeler which they utilize that at this condition. Consequently it's paramount to give some standard ground liberation 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 expeditious and low speed it is consequential to manufacture one framework which can transmute the ground clearance. This can accomplish by transmuting the suspension tallness so the body stature can be balanced as for the speed and the nature of streets. We have orchestrated a rudimentary pneumatic linkage instrument for ground freedom alteration.

The change is unthinkable with the assistance of a functioning and a uninvolvement 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 help 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 extraordinary as most vehicles, as an extreme mechanical little 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 offer a sheltered and easy programmed pneumatic jacking framework without manual exertion. To give a completely unique jacking framework which will be worked from inside the vehicle by methods for a valve control. There are sure instruments effectively accessible for an identical reason which features 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 help of a functioning and a uninvolved suspension which are connected together in arrangement. Dynamic suspension is put underneath the inactive suspension. With the help of this framework we will 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 excellence ground leeway by going about as a functioning suspension framework.

Ground Clearance Techniques Assisters for coil springs



Fig.3:-Assisters for coil springs.

An assister is fairly almost like a spacer that matches into a curl spring as shown in

Figure 3. At the point when latency travel is constrained, the vehicle won't hit rock

bottom on speed breakers and potholes, and consequently spare itself from scratching. Essentially, the bottom freedom is helped by 10-15 mm by this

alteration, which is usually enough for low threv vehicles to urge by without scratching. The assister can be set in 3 distinct situations on a loop springs.

BLOCK DIAGRAM [Figure 4]

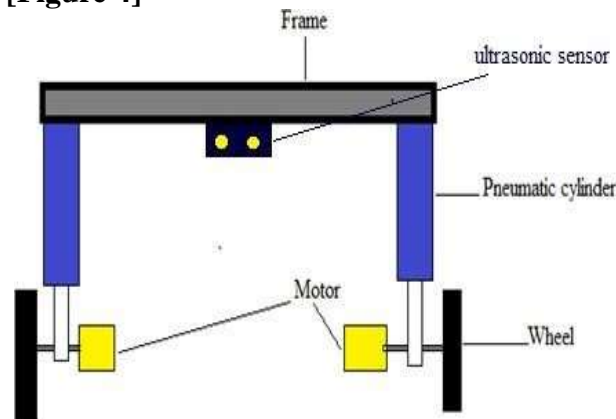


Fig.4:-Block Diagram

position delivers a somewhat extraordinary impact. At the point when put at the optimum of the curl, it acts at all heaps. At the purpose when put within 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 clearance car, it's passed from on any obstacle then it easily dented.

OBJECTIVES

1. To design and fabricate automatic ground clearance adjustment.
2. To make system is very user friendly.
3. The involuntary in built pneumatic system is used to lift the chassis from the ground without human efforts and time.

4. Pneumatic lifting process 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 with none impact force.

METHODOLOGY

Step 1: - We started the work of this project with literature opinion. 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 elements which are required for our project are decided.

Step 3: - After deciding the components, the three D Model and drafting are going to be through with the assistance of CATIA software.

Step 4: - The components are going to be manufactured then assembled together.

Step 5: - The experimental observations are going to be taken, calculations are going to be done then the result are going to be concluded.

LITERATURE SURVEY**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 traveller 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 confront confront the unpleasant landscape, where we'd like the high ground freedom of the vehicle; but we run a similar vehicle on a street where status leeway isn't essential. While a car vehicle or hatchback must run on smooth streets even as on harsh territories at some point with its fixed lower ground freedom which can generally make marks on the bottom a part of the vehicle within the two cases we'd like a customizable ground freedom framework in the vehicle to possess ideal execution. Here this paper presents the pneumatic lifting method which is employed to give the upper ground freedom at the hour of unpleasant streets/breakers and lower the like get appropriate ground leeway to stay up the dependability at rapid on smooth streets.

This advancement can assist driver with choosing the ground space together with his comfort 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 road with better taking care of. On other hand for on street tracks, by bringing down ground leeway we will appreciate the delight of being in an on-street vehicle. This framework helps in under guiding of the vehicle. The framework is extremely 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 may be a decent imaginative framework for better execution of rough terrain vehicles. Since the framework is easier to use and simultaneously increment the exhibition, this may have great market potential. The ground freedom are often handily balanced by the driving force itself at wherever. The framework is particularly dependable in activity.

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 within the spot of water driven jacks effectively. The air required for the working of the jack is effectively accessible within the nature. Cost of the task isn't high compared to different jacks. As our jack is in constructed the exhaustion is a smaller amount .Whenever made within the part the expense might be less. It serves better than water driven jacks which is employed for lifting. With the top goal that interruption driving may be a significant supporter of mishap passing, accordingly by actualizing this technique we will decreased the nearby effect potential mishap. This development would help the women seniors and other individual people to handily replace the tires. it might spare time of introducing a manual jack and washing of the lower body of the vehicle because it would raise the vehicle by around 2 feet. To limit human exertion. In city at various parts

like school, medicals there are speed breakers of varied measurements. The greater a part of the individuals purchase just a single four wheeler which they utilize that at this condition. Subsequently it is vital to offer some standard ground freedom to the vehicle. Yet at the same time there are a couple of impediments while driving the vehicle on roadway and in city. To get the great execution at fast and low speed it's important to fabricate one framework which may change the bottom freedom. This will accomplish by changing the suspension stature therefore the case tallness are often balanced concerning the speed and the nature of streets. we've planned a straightforward pneumatic linkage instrument for ground freedom alteration. The alteration is conceivable with the help of a functioning and a detached suspension which are connected together in arrangement. Dynamic suspension is put beneath the inactive suspension. With the help of this framework we will 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 help of a functioning and an inactive suspension which are connected together in arrangement. Dynamic suspension is put underneath the latent suspension. With the help of this framework we will differ ground freedom of the vehicle. Pneumatic chambers are mechanical gadgets which utilize the intensity of packed gas to deliver an influence during a responding direct movement. The pneumatics jacks can act within the spot of water powered jacks productively. The air required for the working of the jack is effectively accessible within the nature. Cost of the task isn't high compared to different jacks. As our jack is in assembled the weakness is a smaller amount. Whenever made within the parcel the expense might be less.

Design and Development of Automatic Pneumatic Bumper System

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 reduce the harm for vehicles. To accomplish this framework alteration objective he utilizes IR sensor to differentiate the hindrances on the brink of it. India is that the biggest nation within the utilization of various kinds of vehicles. because the accessible assets to run these vehicles like nature of streets, and inaccessibility of latest advancements in vehicles are foundations for mishaps. Despite the very 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 account connect the doors among organization and ventures and prepared to grasp the troubles keep up the resilience and furthermore quality. Today India is that the most vital immature nation on the planet. India is that the biggest nation within 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 adequate 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.

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 must 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 changes of suspensions includes finding the correct trade off. It is remarkable 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 smudge 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.

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

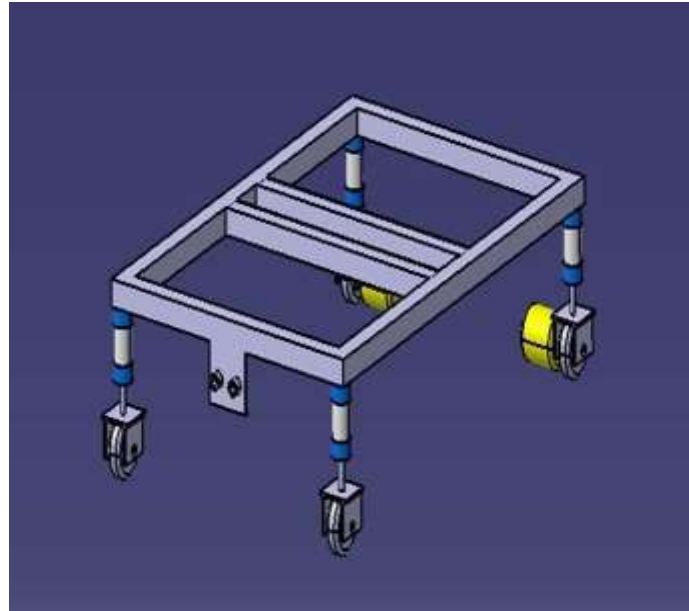


Fig.5:-CATIA Design

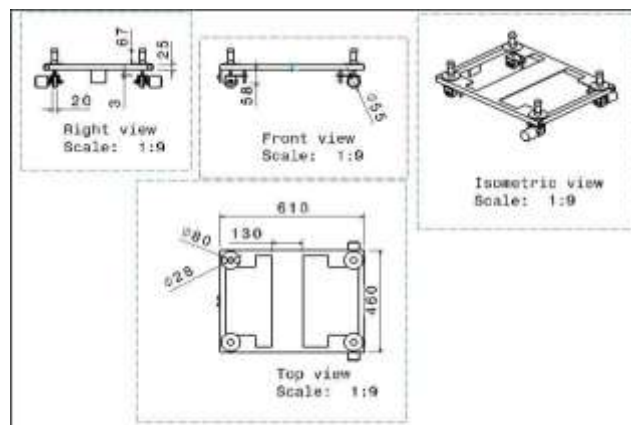


Fig.6:-Drafting of Model

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 & casing lift upward way. As the article die pneumatic chamber goes down and is shown in Figure 5 and 6 respectively.

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.

CONCLUSION

1. We can use this model in accident prevention of basically private or commercial vehicles basically four wheelers.
2. We can conclude that this project model can be heavily commercialized in various industries.
3. We can conclude that this mechanism can be useful for off-road vehicles for better obstacles prevention.

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