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ADVANCEMENT IN DESIGN OF AUTOMOBILE DOOR'S BY INTRODUCING NO-SPACE DOOR SYSTEM

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ABSTRAC

The overall number of vehicles around the world is huge. The maximum number of cars with the conventional system and some are with the modern system and design. Now vehicles are operated by electrically. Next step is to introduce some modern or advanced system to vehicle structure. To overcome the problems with the conventional system or traditional methods.

The problems with the vehicle door system are that uses considerable amount of space other than the vehicle space. Required optimum space in parking area for door opening and if suddenly door opens it may cause serious accident. To overcome such a problems, we introducing "ADVANCED-NO SPACE DOOR SYSTEM" we have one prototype modal which will clear out basic concept about the system. The concept is that the doors of the vehicle open (slide down to bottom of vehicle). This movement will be performed by rack and pinion arrangement the direction of door is guided by curve guide which is provided to the frame of vehicle. The pinion is operated by the DC motor which supplied by 12V battery. When door slides to bottom then it hide in case which is provided between vehicle bottom and seat support it means that seats are supported on the case. The other components of vehicles are as it is arranged.

Keywords: *eliminates extra space, zero efforts, avoid accidents.*

INTRODUCTION

The information search is the first step in any project thesis. Accordingly, after an accurate and an intensive process of researching, a great database for car doors was obtained from several sources.

Organizing the information is the next step in the progress of the process which is not as important as the searching, but is still decisive for a successful result. In this case, a market analysis becomes crucial for a correct understanding of the door mechanism.

Advanced no-space door system itself indicates that the doors doesn't needs any space for its working and provides more space for coming out of the car and sit in. there are many problems with the conventional doors it needs efforts to open and close doors also it requires the space outside the vehicle which is not comfortable in the coming out of the car when there is less space outside and opening doors on the street also cause many accident's and damage to vehicle as well as to human life. Below we have designed the car door to avoid the above-mentioned problems of door will open in the same space in which it is fitting and slides underneath the body of car in the cavity present in the chassis of the car. As a consequence, the door mechanism chosen for this project comes out taking into account all of these doors that a user can find in the industry. Besides, thanks to this study it has been possible to achieve a system that will improve this market with the main objective of creating a user-friendly door for unconventional people (old people, physically handicapped people, children…).

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OBJECTIVES

This project aims to find a solution for most of the difficulties that a conventional car door causes in several situations such as parking space between cars or car and obstacles, difficulties for disabled people when they get in/off the car. The selected mechanism is a sliding door, vertical door or disappeared door. All of them have the same functions although their design differs. Firstly, we will study the most suitable door to solve the problem of the parking space, which is the most important aim in this project. With one of those kinds of doors we will see the difficulties that people normally have when they park their cars, as it is usual to have problems of space when you get off the car in places where the parking space is very narrow. Regulations relating to parking spaces do not really consider the necessity of enough space when opening a car door. Therefore, the solution for this limitation is the main goal of the door design. Secondly, another reason to study one of those doors is to facilitate the entrance for disabled people. Regarding the available space, if a person without mobility problems have some difficulties to get into a car, for an old or disabled person it will be more problematic indeed. The door which is designed provides these kinds of people with an easy entrance to the car. This door will not be limited in its opening ratio as it can be opened completely wherever place the car is parked, making more comfortable its use. Besides, in this project materials and manufacture methods will be considered to be available for a general car market, which means, that the mechanism is accessible to all kinds of users with different necessities. Finally, the design process is focused on creating a new concept of door. This is not the most important objective but we want the product to be at the same time, elegant, smart, fashionable, comfortable, economical and manoeuvrable.

MARKET ANALISYS

Actually, in any project in which a new product is being developed, a market analysis becomes a necessary part of the work. All the new ideas that an engineer has to consider are based on it. The door, that this project is focused on, is not really a new concept. There is a vast market where a customer can look for his/her most suitable commodity to be satisfied. Therefore, the goal of this study is to investigate all the existing options related to this product. In order to satisfy a solution a new door mechanism is chosen based the selection on this analysis. Consequently, the new product becomes more comfortable and exciting for future consumers.

KINDS OF DOORS

The most common door which can be found in cars market is the classic door. It is the most common door used, it is well known to everyone because it opens like the typical door in a conventional house. Being very common, the assembly becomes fitting, cheap and also simple although it has a disadvantage because a huge lateral space is needed for its manipulation. The same disadvantage can be found in a gull wing door although this door makes easier the entrance as its opening is in the upper side of the car.

Conventional doors

Butterfly doors

Scissor doors

Furthermore, being unrelated to the previous gates, the sliding door appears in the car world. This door is opened by sliding out on rails so that small lateral space is needed for its handling. With these features the entrance and the exit are facilitated but the bodywork must be modified.

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An easy and cheap construction system is one which consists of slides where the door is placed on rails located on the bodywork. But, in this case the bodywork must be changed, taking into account that the space is limited by the rear wheel.

PROBLEM ANALISYS

It is not necessary to build the entire car model because the mechanism is based on a SUV car but any vehicle can take advantage of this device. Instead of only the door, the opening mechanism is also constructed. In the picture below the area marked in red which becomes the aim of the project.

Difficulties in tight parking.

By analysis we come to know that we face many problems with the conventional doors used in the available cars in the market parking in the tight parking is a very difficult task and also going in/out of the car if there is very less space outside the car the conventional doors which are also known as gull wind doors this takes approximately 40% extra space outside the car of its width. This makes impossible to park the vehicle in the tight parking space and going in/out of the car.

Accident due to sudden opening of door.

Parking the vehicle in the side of the road is the most common way of parking but also the most dangerous way to park the vehicle. Because on the road there is continuous flow of vehicles at very high speed. When we open the door after parking the vehicle for coming out of the vehicle it may cause a very serious accident as any car can strike the door suddenly opening without any indication and may result in very severe problem and cause damage to vehicle and human life.

CONSTRUCTION

The project is actually the model of advanced no-space door system and consists of basic components like 12 V electric motor and battery, rack and pinion (manufactured by trial and error method), sliding guide, sheet metal (structure), hollow square rods, driving shaft, etc. The frame of the model is made up of hollow square rods of 0.5” `to support the assembly of door and mechanism used for driving it. The sheet metal used for making the body of door is of 18 gauge. The rack used in the model is taken from the mechanism of power windows. The

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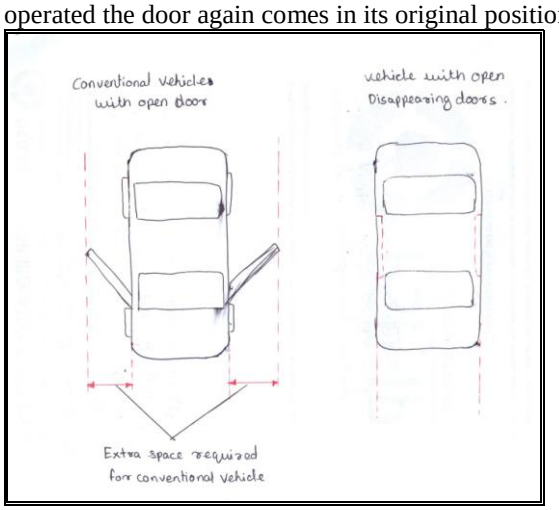
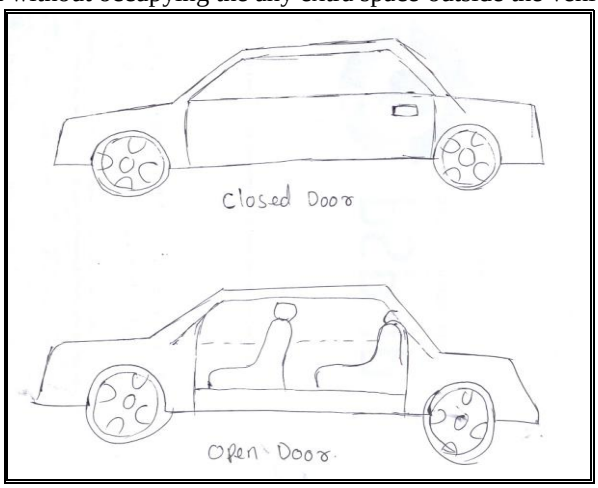
motor used is a high torque low speed generally used in wipers of automobiles. The motor is powered by 12V DC battery which generally used in motor cycles.

WORKING

The model of advanced no-space door system is based on the objective of eliminating the space and efforts required to open and close the doors of automobile. In order to design this type of advanced system curved rack and pinion is the most appropriate and suitable solution. When the driver pushes the switch the 12V DC battery supplies the current to the high torque motor which is connected to the driving shaft. Driving shaft consists of 2 pinion gears which are meshed with the teeth of the curved rack which is attached with the door body. As the motor rotates the pinions on the driving shaft also rotates and the door starts to move in downward direction and goes completely underneath the floor of the car in the cavity present in the chassis. Again, when the switch is operated the door again comes in its original position without occupying the any extra space outside the vehicle.





ADVANTAGES

- The system totally eliminates the door opening space required for opening conventional doors.
- No efforts required for opening doors.
- Very easy to get in/out of the car for physically challenged people.
- No chances of hitting other vehicles by sudden opening of the doors.
- Parking of vehicles very closed to each other's is possible.

CONCLUSION

By introducing the no-space door system in the automobile sector can make the revolutionary changes. As seeing the increase in the number of automobiles on roads the most commonly faced problem is of parking the vehicles in the town. The space required for the opening of the conventional doors is about 40% of the width of the car this tends to park the vehicles apart from each other. If the no-space door system is used the vehicles can be parked very close to each other and in the same place many vehicles can be parked. This system may also help to the physically challenged peoples to easily come in/out from the vehicles without any extra efforts which are required to push and pull the door.

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