

Design and Development of Vehicle Lifting Mechanism with Lateral Wheel Drive for a Car in Traffic and Parking

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Abstract:- In world cities are not built for increasing population of cars. However, it is possible to create cars to suit traffic condition of the cities. A driver finds it difficult to park his/her car on city lanes. Parallel parking, as compared to angled parking or perpendicular parking, is considered the most difficult parking method by drivers. However, it is still used as it is most suited for narrow roads. The aim of this project was to develop a mechanism for city cars to make parallel parking easier.

A miniature working model of mechanism we were developed. The mechanism developed is affordable and it can be used in different car models with small modification in it. In this project Maruti Suzuki Swift is considered as a benchmark vehicle. The main aim of this project is to move vehicle in lateral direction. In order to achieve this, a new mechanism which consist of four wheel link which can be actuated by two pneumatic cylinders. This mechanism was modeled using NX-7.5 CADD software.

INTRODUCTION

Car companies around the globe are bringing new concepts which are least polluting, which will minimize driver's effort to drive in traffic and to easily park the vehicle in congested city area. As parking is measure being in cities, this project is focused to reduce the effort made by car drivers to park the car in a city area. In this world, the cities are not built for cars. Even though new cities are well planned, day by day increase in the automobiles keep traffic and parking in the cities unpredictable. Depending upon the arrangement of the vehicles, the street car parking is classified as parallel parking, angle parking, perpendicular parking and Anderson Parking. Among these types of parking Parallel parking is considered the most difficult, tedious and annoying task for many drivers.

An automobile equipped with this mechanism can be driven sideways in either direction as easily as forward or backward, so that it can be quickly moved into and out of parking position, out of a rut or hole in the highway, or whenever a side movement of car is necessary. Another use of my device is as a jack to hold the car up for changing tires or giving access to parts underneath.

LITERATURE SURVEY:-

For designing of this mechanism we referred various literature, papers etc. The review of previous method used given below: In this first review paper it relates to automobile and its object is to provide practical

means for lifting and/or driving a car sideward in either direction. This parking mechanism has no connection with engine and is controlled entirely by hand keys or buttons on the instrument panel of the car.

We also taken review of another mechanism, its implementation requires less modification on an existing car. Under body of car will need some modification to fix the mechanism. As shown in fig, the mechanism consist of four small wheels on which a car is lifted and parked .It is a toggle type mechanism driven by rack and pinion .each wheel is connected to a gear rack with pushing bars. Two racks are located at the front with a common pinion gear.

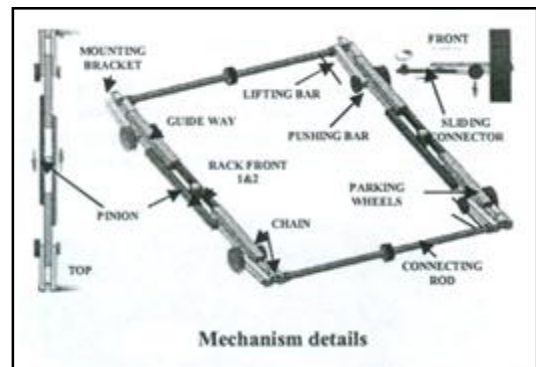


Figure No.1:- Mechanism details

As shown in fig, the pushing bar is pivoted to the lifting bar with a parking wheel acts as toggle point and other end of the lifting bar is pivoted to the connecting rod. When pinion gear rotates in anti-clockwise direction, both racks move towards outside and trigger the toggle action of lifting and pushing bars. Same process happens at the rear side also as the car is lifted uniformly.

DESIGN PHASE 1:-

In this phase, we have taken the actual dimensions of "Maruti Suzuki Swift" and according to that dimensions we started thinking on lifting mechanism without disturbing the ground clearance of the car. But it was very difficult to make the prototype of actual dimensions, so to avoid this difficulty; we reduced the dimensions and scaled it.

It consist of double acting pneumatic cylinder to lift the car. Due to scaled, its weight became less as compare to original model, so here we are using pneumatic cylinder. In this project we were focused on dimensions such as: Ground clearance, length, width, height. This scaled model consist of Ground clearance dimension same as that of original model.

Dimensions	Original Model Dimension (mm)	Scaled Model Dimension (mm)
Length	3850	1300
Width	1695	600
Height	1530	200
Ground Clearance	170	170

Chart No.1:-Design Parameters

DESIGN PHASE 2:-

In this phase, we made a presumed drawing model of lifting mechanism by using NX cad (UNIGHRAPHICS) according to the new scaled dimensions.

We designed new “Lifting Mechanism with Lateral Movement”. In this method, the idea is to lift the car on additional four wheels and park the car. A lifting and parking mechanism which can be attached to the bottom of the car could be a solution for parallel parking.

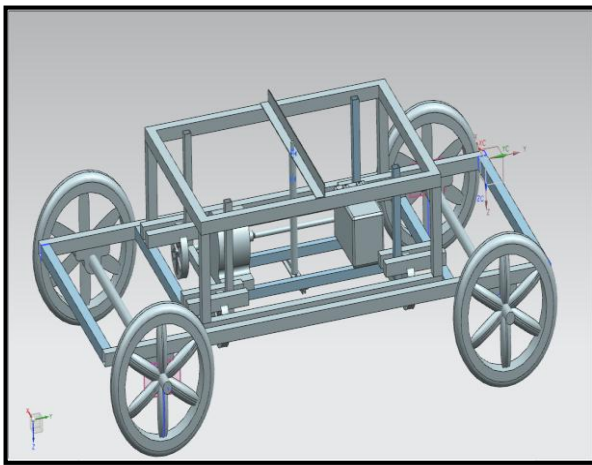


Figure.2:- Dimensional View of Lifting Mechanism

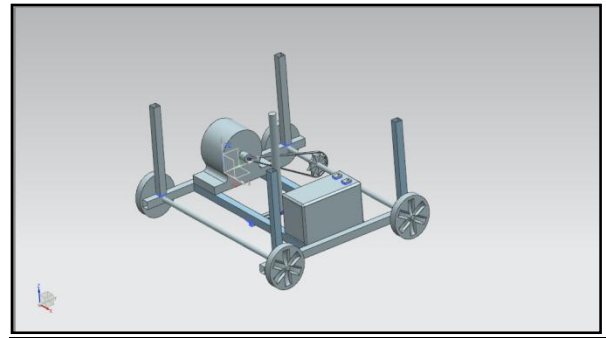


Figure No.2:- Drafting Sheet of Mechanism (Drawn in NX-CADD)

Above figure depicts the working of lifting and parking mechanism. A driver finds suitable parking place and stops there. Then he/she chooses the option to park vehicle towards right side or left side. Next, on pressing the parking lever, parking mechanism starts working and lifts the car on four additional wheels mounted perpendicular to the chassis. Then car automatically moves on these wheels to the direction selected. After parking the car, driver presses the normal position lever and the mechanism automatically brings the car back to its normal position.

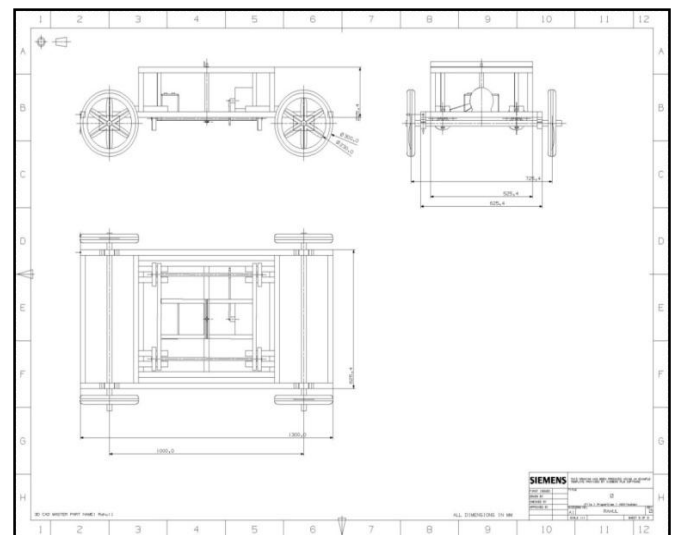


Figure No.4:- Dimensional View of Project vehical (NX-CADD)

Result: - I am getting perfect parking through Vehicle lifting mechanism with lateral wheel drive.

Future Scope: - I had done this project on prototype and conceptual basis. This mechanism has future scope that is this mechanism can be installed in an actual car or separate lateral wheel drive can be used on international airport for automated multi-storage parking.

CONCLUSION

Based on the studies made, the following conclusions can be drawn:

- The mechanism developed can be used on different car models with simple modification in the mechanism and car.
- It is feasible to develop an add-on mechanism that will make parallel parking in crowded areas easier.
- This mechanism has another use of as a jack to hold the car up for changing tires or giving access to parts underneath.
- This mechanism is comparatively simple.

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