

# DESIGN AND FABRICATION OF PARALLEL PARKING SYSTEM IN FOUR WHEEL DRIVE

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## ABSTRACT

*The growing population of India has created many problems one of the challenging ones being car parking which we confront almost every day. Besides the problem of space for cars moving on the road, greater is the problem of space for a parked vehicle considering that private vehicles remain parked for most of their time. While residential projects still escape with designated parking, the real problem lie with commercial spaces many a time which is overcome by taking extra open spaces to park. So we came up with new idea that is to park the car parallel on the side of the road which will reduce the extra space required in front and backside of the car. The main aim of this project is to reduce the traffic in the parking place. Normally we can see in the multiplexes, cinema halls, large industries, and function halls there is problem they have to go and search which line is empty and which line having place to park the vehicle, for parking then they need workers for parking in correct position it is the money consumed process. And during car parking we have to search a place to park our car for that there is consumption of fuel takes place. So to avoid this problem we are going to design one mechanism to attach it at the bottom of the car having small size four wheels called 'auxiliary wheels' which will be making 90 degree angle with respect to the longitudinal axis of the car and these will help the car to park in parallel direction. In this car we are going to use mechanical actuator to uplift our mechanism in order to maintain the ground clearance. This mechanism will be totally independent from the engine due to that no fuel consumption takes place during parking the vehicle. So by using our mechanism the traffic can be reduced in the parking place of the theatres, multiplex, and in large industries and in commercial places*

**Keyword :** -Parallel Parking, Actuator, Wheels, Chain Drive, DC Motor, Steering Mechanism, Controller

## 1. Introduction

With the dramatic increase of the automobile use in India, parking has become an integral part of the modern urban setting and an important land use. Today, parking related concerns are no longer confined to the city center; they extend throughout the urban region. Parking contributes to the appearance of city and suburbs; affects traffic congestion and traffic operations; and is a vital component of the urban street and transit systems. Its availability influences the choice of mode and route of travel, affecting the viability and competitive posture of commercial areas. Most of research work reported in the literature confirms that angle parking is more hazardous than parallel. The principal hazard in angle parking is the lack of adequate visibility for the driver during the backout maneuver. Additional hazard results from the drivers who stop suddenly upon seeing a vehicle ahead in the process of backing out. Several more studies have compared the crash experience of angle and parallel parking and reported crash rates for parallel parking to be from 19 to 71% lower than those for angle parking. When on-street parking is deemed necessary, it should be of parallel rather than angle type. Our project aim is to make on-street parallel parking easy and more beneficial into society. We designed a prototype showing the transverse car parking mechanism. This mechanism can be attached with a modern car. This mechanism contains pneumatic or hydraulic system which lifts the car on small auxiliary four wheels. Auxiliary wheels have a 90 degree angle with respect to longitudinal axis of car. The auxiliary wheels can also flip inside the car space while the mechanism is not in use. This mechanism can also be use as a built in-jack to raise the car for changing tires or repairing works.

## 2. Literature Survey

### 2.1 Sanjay Kumar Singh “Case study on Road Accident Analysis of Patna city”.

This paper proposes how urban transport facilities in most of the Indian cities are inadequate and deteriorating over the years. The development of public transport system has not keep pace with traffic demands in terms of both quality and quantity. Road accident in urban areas are analyzed in this paper published in “Urban Transport Journal [1]

### 2.2 Zeenab Aneez-“Case study on Parking Space in Kochi city”.

Through this paper author analyzed how urban transporting facilities are increasing day-by-day and due to this there is not enough parking facilities are provided according to that. There is different types of parking are there but out of that on-street and off-street parking are mainly seen on Indian roads are to make them efficient is mainly done in this paper. : Issues and Solutions” published in “Centre for public policy research” in Nov 2010 [2]

### 2.3 K V Krishna Rao-“Introduction to Transportation Engineering.”

Through this paper author analyzed different parking types , problems over parking and solutions over the problems. published in “IEEE Journal”, in May 2006 [3]

### 2.4 Zamri Mohamed- “Prediction of Car Ground Clearance”

This paper proposes in layout drawing, one of the basic components that it must have is the estimation of ground lines that will enable engineers to measure the clearance of car components especially the lower part to ground. This paper explains how to formulate simple equations in order to estimate the location of ground lines by taking into account the suspension characteristics of the car published in “Malaysian Technical Universities Conference on Engineering and Technology June 20-22, 2009, MS Garden, Kuantan, Pahang, Malaysia[4]

### 2.5 Vishnu Garg-“ Accident Prevention Based on Automatic Detection of Accident Prone Traffic Conditions: Phase I.”

Through this paper author analyzed how urban transporting facilities are increasing day-by-day and due to this there is not enough parking facilities are provided according to that. Through this paper author had analyzed various accidents are occurring and how to prevent it with the help of Automatic Detectors. published in "Intelligent Transportation Systems Institute [5]

### **2.6 S. Sarayu-“ Design and Fabrication of Prototype of Automated Smart Car Parking System using Programmable Logical Controllers (PLC).”**

This paper proposes a novel, secure and intelligent parking system, which greatly reduces fuel consumption of the vehicle, traffic congestion and environmental pollution with the use of Programmable Logical Controllers (PLC) in automation. The main advantage of this technology is space optimization, cost effectiveness, security, environmental protection, low maintenance and operating cost and safety of the vehicle. PLC has been used in the design of the prototype model because it is more reliable and faster in operation. Demonstration at the internal evaluation gave expected results. [6]

### **2.7 Hamada R. H. AI-Absi - “Vision-Based Automated Parking System.”**

This paper describes an approach to overcome a situation of monitoring and managing a parking area using a vision based automated parking system. With the rapid increase of cars the need to find available parking space in the most efficient manner, to avoid traffic congestion in a parking area, is becoming a necessity in car park management System published in "10th International Conference on Information Science, Signal Processing and their Applications (ISSPA 2010)", in Sept 2010 [7]

### **2.8 Jazar R.N-“ Forward Vehicle Dynamics”**

This paper proposes that how different forces are acting on wheels of the car and how to calculate those forces are mainly given in this paper. [8]

### **2.9 Anumita Roy Chowdhury -“Failures in floor parking system in Delhi city.”**

This paper proposes the problems of car parking in urban cities like Delhi and what are the problems arised due to Multi-level parking system.[9]

### **2.10 Hongwei Wang-“ A Reservation-based Smart Parking System.”**

This paper proposes finding a parking space in most metropolitan areas, especially during the rush hours, is difficult for drivers. The difficulty arises from not knowing where the available spaces may be at that time; even if known, many vehicles may pursue very limited parking spaces to cause serious traffic congestion. In this paper, we design and implement a prototype of Reservation-based. Smart Parking System (RSPS) that allows drivers to effectively find and reserve the vacant parking spaces.[10]

### **2.11 N V Iyer -“2 and 3 wheelers in India.”**

This paper proposes the problems of cars, 2wheelers, 3wheelers in India. It also proposes how urban transport facilities in most of the Indian cities are inadequate and deteriorating over the years. The development of public transport system has not keep pace with traffic demands in terms of both quality and quantity. Road accident in urban areas are analyzed in this paper.z [11]

### 3. SUMMARY

Parking is one of the major problems that is created by the increasing road traffic. It is an impact of transport development. The availability of less space in urban areas has increased the demand for parking space especially in areas like Central business district. This affects the mode choice also. This has a great economical impact. With the dramatic increase of the automobile use in India, parking has become an integral part of the modern urban setting and an important land use. Today, parking related concerns are no longer confined to the city center; they extend throughout the urban region. Parking contributes to the appearance of city and suburbs; affects traffic congestion and traffic operations; and is a vital component of the urban street and transit systems. Its availability influences the choice of mode and route of travel, affecting the viability and competitive posture of commercial areas. Most of research work reported in the literature confirms that angle parking is more hazardous than parallel. The principal hazard in angle parking is the lack of adequate visibility for the driver during the back out maneuver. Additional hazard results from the drivers who stop suddenly upon seeing a vehicle ahead in the process of backing out. Several more studies have compared the crash experience of angle and parallel parking and reported crash rates for parallel parking to be from 19 to 71% lower than those for angle parking. When on-street parking is deemed necessary, it should be of parallel rather than angle type. Our project aim is to make on-street parallel parking easy and more beneficial into society. We designed a prototype showing the transverse car parking mechanism. This mechanism can be attached with a modern car. This mechanism contains pneumatic or hydraulic system which lifts the car on small auxiliary four wheels. Auxiliary wheels have a 90 degree angle with respect to longitudinal axis of car. The auxiliary wheels can also flip inside the car space while the mechanism is not in use. This mechanism can also be use as a built-in-jack to raise the car for changing tires or repairing works

### 4. PROJECT WORKING

The system contains a battery of 12 V, Pedestal Bearings, Lead screws, Geared motors. In this type of mechanism auxiliary frame is attached with a mechanical actuator. Actuator is attached with auxiliary frame. For fixing auxiliary frame centre of gravity is resolve. actuator shaft is move forward in linear motion and the mechanism is controlled by lead screws movement. When the actuator pushes the auxiliary frame the whole car is lifted and the car is ready to move in transverse direction. The transverse movement of car is controlled by remote controller. The controller activates 30 rpm auxiliary wheels motors. In order to provide stability to auxiliary wheels lead screws are helpful.

### 5. CONCLUSIONS

The main aim of this project is to reduce the traffic in the parking place. Normally we can see in the multiplexes, cinema halls, large industries, and function halls there is problem they have to go and search which line is empty and which line having place to park the vehicle, for parking then they need workers for parking in correct position it is the money consumed process. And during car parking we have to search a place to park our car for that there is consumption of fuel takes place. So to avoid this problem we are going to design one mechanism to attach it at the bottom of the car having small size four wheels called 'auxiliary wheels' which will be making 90 degree angle with respect to the longitudinal axis of the car and these will help the car to park in transverse direction. The design and development of a prototype of the Parallel car parking mechanism has been done under the scope of a B.E. mechanical engineering project. Auxiliary wheels, DC motors are used to provide motion to the vehicle in the parking system. Mechanical Actuator is used to lift the main frame. The main advantages of this mechanism is to reduce the space requirement during on-street parallel parking, efforts required to park the car are minimum, Time required to park the vehicle is reduced. Main advantage of this mechanism is to reduce fuel consumption. And this mechanism can be use like built-in jacks. With the help of transverse car parking mechanism vehicle can be taken out easily from traffic jams which are the biggest problem on Indian roads.

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