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# Review Paper on Different Types of Car Parking System

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**Abstract:** *The population of the world is continuously increasing and the parking is major problem of the world. In this review paper we have explain different types of car parking system. According this types we manage the car parking space and decrease the trafficking in urban areas. Advantages of the different types of car parking is that optical utilization of space for comfort driving, stress for struggling the car parking is taken of, more security and environment harmony.*

## I. TYPES OF CAR PARKING SYSTEM

### A. On Street Parking

On street parking means the vehicles are parked on the sides of the street itself. This will be usually controlled by government agencies itself. Common types of on-street parking are as listed below. [Ref.1]



Fig.1 On street parking

### B. Off Street Parking

Off street parking means vehicles are parked off the street itself. This will be usually controlled by commercial agencies itself. [Ref.1]

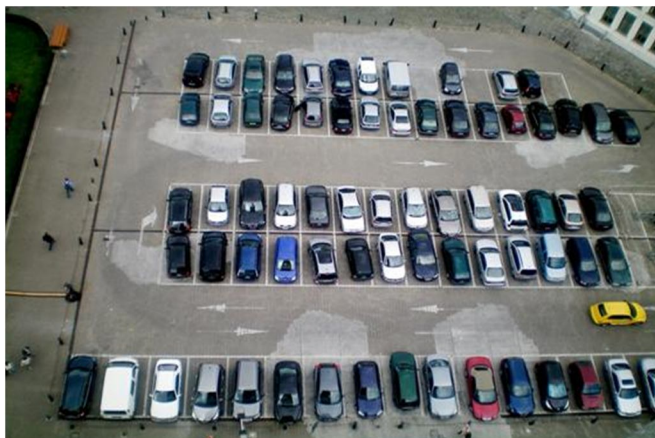


Fig.2 Off street parking

**C. Parallel Parking**

The vehicles are parked along the length of the road. Here there is no backward movement involved while parking or un parking the vehicle. Hence, it is the safest parking from the accident perspective. However, it consumes the maximum curb length and therefore only a minimum number of vehicles can be parked for a given kerbed length. This method of parking produces least obstruction to the on-going track on the road since least road width is used. [Ref.1]



Fig.3 Parallel parking

**D. 30° Parking**

In thirty-degree parking, the vehicles are parked at 30 with respect to the ruined alignment. In this case, more vehicles can be parked compared to parallel parking. Also, there is better maneuver-ability. Delay caused to the track is also minimum in this type of parking. [Ref.1]

**E. 45° Parking**

As the angle of parking increases, a greater number of vehicles can be parked. Hence compared to parallel parking and thirty-degree parking, a greater number of vehicles can be accommodated in this type of parking. [Ref.1]

**F. 60° Parking**

The vehicles are parked at 60 to the direction of road. More number of vehicles can be accommodated in this parking type. [Ref.1]

**G. Right Angle Parking**

In right angle parking or 90parking, the vehicles are parked perpendicular to the direction of the road. Although it consumes maximum width kerbed length required is very little. In this type of parking, the vehicles need complex maneuvering and this may cause severe accidents. This arrangement causes obstruction to the road track particularly if the road width is less. However, it can accommodate maximum number of vehicles for a given kerbed length. [Ref.1]

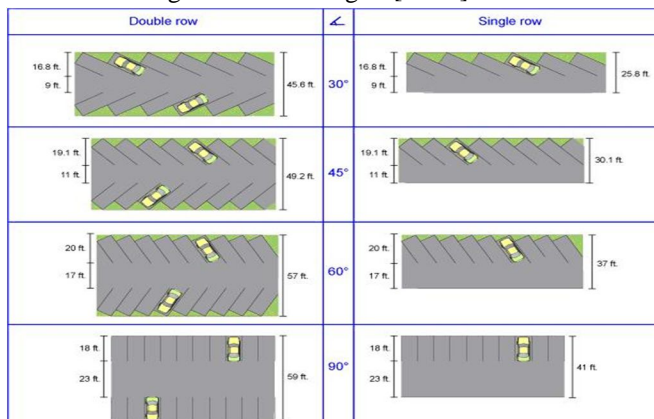


Fig.4 30° parking, 45° parking, 60° parking, Right angle parking

### H. Valet Parking

Valet parking is a parking service offered by some restaurants, stores, and other businesses. In contrast to "self-parking", where customers find a parking space on their own, customers' vehicles are parked for them by a person called a valet. This service either requires a fee to be paid by the customer or is offered free of charge by the establishment. [Ref.2]

### I. A Semi-Automated Parking

A Semi-Automated Parking System uses a mechanical system to move cars to their parking space, only it needs a human action to work, either by the driver or an attendant. This action can be as simple as pushing a button. [Ref.3]

### J. Rotary Car Parking

It is simple to operate with the driver parking and leaving the vehicle in the system at the ground level. Once the driver leaves the incorporated safety zone the vehicle is automatically parked by the system rotating to lift the parked car away from the bottom central position. This leaves an empty parking space available at the ground level for the next car to be parked on. The parked car is easily retrieved by pushing the button for the relevant position number the car is parked on. This causes the required car to rotate down to ground level ready for the driver to enter the safety zone and reverse the car out of the system. [Ref.4]



Fig.5 Rotary car parking

### K. Tower Car Parking

A tower car parking system is one type of an automatic car parking system that is mechanically designed to vertically allocated parking spaces, especially in areas that have very small and narrow plots. This system is also known as an elevator parking system as it uses a lift mechanism to reach the various level. [Ref.5]

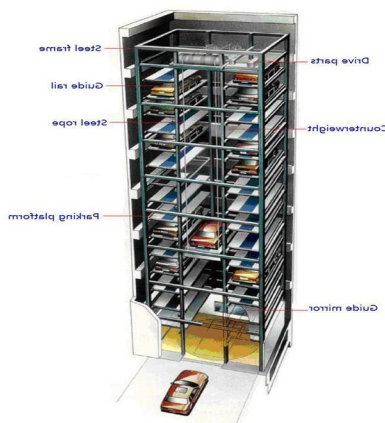


Fig.6 Tower car parking

*L. Two Post*

Two post car parking system the two cars can be park in this system. Once car enter in system the pallet lifts the upper side and below the pallet another car can be park. [Ref.6]



Fig.7 Two post parking

*M. Multi Storey car Parking System*

Automatic multistoried car parking system helps to minimize the parking area. In the modern world where parking space has become a very big problem, it has become very important to avoid the wastage of space in modern big companies and apartments etc. in places where more than 100 cars need to be parked, this system proves to be useful in reducing wastage of space. This automatic car parking system enables the parking of vehicles, floor after floor and thus reducing the space used. Here any number of cars can be parked according to the requirement. These makes the system modernized and thus space-saving one. [Ref.7]



Fig.8 Multi storey car parking system

## II. LITERATURE REVIEW

- A. This project is aimed to design an efficient parking system and helps to minimize the parking area in the city. In the modern world where the parking space has become a major concern, in our city. The VISAKHAPATNAM city is recommended for smart city, which includes all the facilities like tourism, commercial complexes, institutions etc. All these facilities lead to the traffic congestion and efficient need for parking. [Ref.8]
- B. We have limited land source so the construction of multilevel parking is very important as it accommodates large no. of vehicles at one place. In this project we have designed multi-level parking for capacity of 600 cars and 550 bikes. i.e. raft foundation, retaining walls, beams, column and flat slab using STAAD-Pro, manual bases and AUTO-CAD software for making various structural drawings. [Ref.9]
- C. Each and every structure will be subjected to either one or the groups of loads, the various kinds of loads normally considered are dead load, live load, earth quake load and wind load. ETABS (Extended Three-Dimensional Analysis of Building System) is a software which is incorporated with all the major analysis engines that is static, dynamic, Linear and non-linear, etc. and especially this Software is used to analyze and design the buildings. [Ref.10]

- D. Our project deals with the Analysis and design of a commercial building was done in ETABS (2016). It is a reinforced concrete framed structure consisting of G+4. And also, we provide a two-wheeler & car parking facility in the ground floor. IS 456:2000 codes are the basic code for general construction in concrete structures, hence all the structural members are designed using limit state method in accordance with the IS 456:2000 code and design aids. India will be recognized by National Building Code (NBC); hence the building is planned in accordance with the National Building Code of India. [Ref.11]
- E. With the increased development of mechatronics system and scarcity of land space, this paper introduces and prospects an engineering application to solve or reduce the mentioned issue by designing and implementing automated multi-level car parking system. The paper discusses the research antiquity, brief model methodology, software implementation, design analysis and recommendations. [Ref.12]
- F. Eduardo Barata, Luis Cruz, João-Pedro Ferreira(2012)2 This study underscores the importance of adopting integrated parking management policies that ensure not only more rational use of the available parking spaces, evenly balancing supply and demand and bringing in revenues to cover the parking facilities costs, but also the improved attractiveness of alternative transportation modes. Parking supply and demand flows within the UC campus are estimated. The results indicate that the parking facility is underpriced and that there is overcrowding. Finally, some policy proposals are discussed. [Ref.13]
- G. It utilizes a new typology which groups parking policy approaches into 'conventional', 'parking management' and 'market-oriented' categories. Several distinct parking policy orientations are identified among the cities studied. It is less surprising that a number of cities, mostly in East Asia, do not have such an auto-centric conventional approach. However, it is a surprise that their parking policies still involve minimum parking requirements and have generally not adopted the most common alternative to the conventional approach (parking management). [Ref.14]
- H. Puay Ping Koh, Yiik Diew Wong (2013)5 this paper focuses on how land use environment influences pedestrians' needs and behavior. Compressibility and strength characteristics of sand and tire mixtures for suitability of sand tire chip mixture for embankment. they concluded that up to 20% compressibility of sand-tire mixture was 1% i.e. in tolerance limit for 10m height of embankment and produced cohesion between 7- 17.5 KPa and also internal frictional angle increased from 38 to 40 degree. [Ref.15]
- I. Some interesting findings are: (1) enlarging the central parking lots is not always desirable; (2) parking fee and capacity should be set in a way that commuters prefer to park in the farther area during early arrival; and (3) a shorter access time always reduces the social costs. Finally, we derive the optimal parking fees, capacities and access times which altogether yield the minimum total social costs. As a result, the optimal parking solution can effectively reduce both the social costs and the queuing delay. Even more intriguing is that, compared to the case without parking choices, all travelers are better off under the optimal parking solution, which cannot be achieved by only imposing a system-optimal dynamic toll. [Ref.16]
- J. The author has worked in the volume of parking and parking policies, had taken the study area was the commercial center of the city of Anand. Two types of surveys to count the volume that had been used survey video recording, the survey of land use and parking survey that had been used for enrollment recording techniques were conducted. He analyzed the data gave the suggestion Amul Dairy road is the use of mixed territory. The data analysis shows that parkers car parks are the maximum short-term and long-term Parker are minimal. In the street parking is prevalent throughout the section of the survey. [Ref.17]
- K. His paper concluded that during weekends and public demand for vehicle parking exceeds the supply, and consequently, has a negative impact on retail sales and not only that, but causes severe dissatisfaction while shopping. The study is descriptive in nature and self-designed questionnaire to collect primary perception was used. parking management and accessibility of the market and its related factors are shopping satisfaction variables to different buyers in different markets. Data collected from the questionnaires are processed using SPSS. [Ref.18]
- L. The parking demand models have been developed using the SPSS software. He had made three types of survey poll parking space, method of investigation used enrollment accumulation. Interview designed for analysis of willingness to pay. It was found that the maximum accumulation occurs in the morning between 12: 00-14: 00 and 17: 00-8: 00 at night. To solve the parking problems, we recommend a short-term immediate solution to congestion pricing, as the cost of operation and maintenance is much lower for the administration of the parking lot on the way to the road. [Ref.19]
- M. Finally, it was shown that in a case has demonstrated the maneuverability of the method. Conclude that there are no discrepancies between the parking needs on the street and off-street parking and the presence of parking durations, factors considered by the parked parking and impacts on traffic flows. Parameters such as the upper limit of the distance of walking and impact on traffic flows on the road are used to meet the different needs of Parkers parking and traffic flows. [Ref.20]

- N. These difficulties are seen especially in the most densely populated areas which are poorly served by public transport and in which the planning and the use of existing areas is inadequate. This article presents a methodology that supports the feasibility of implementing an integrated parking system based on Internet resources. Expected results indicate that the benefits derived from it are the lower levels, where appropriate, of traffic congestion in the area in question, and reduce air pollution. [Ref.21]
- O. Consumers choose the size of the purchases to minimize the total cost of purchases of goods with the lowest price, which includes the purchase and storage costs. The waiting time in the queue increases until the market is cleared. The authors point out that consumers are not better than a maximum price, even if suppliers are worse, thus generating a net loss of rationing waiting. (See also & Sonstelie Deacon [1985 1989], and Deacon [1994]). [Ref.22]

### III. CONCLUSION

- A. People give positive response to manage the parking spaces through this different types of car parking and it's also time restrictions.
- B. As we know the most common problem in the world is traffic and here we manage the parking space .
- C. The provision of different types of car parking and their effective use emerges as the most viable initiative in the cities.
- D. Proper parking manages reduce the traffic on road. The improvement of car parking is not only impact on road safety and traffic but also improvement in local economy.

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