

DESIGN AND FABRICATION OF SMART PARKING SYSTEM



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ABSTRACT

In metropolitan cities, vehicle parking has become a major concern in all busy areas and a good traffic system needs a good parking system. Different types of vehicle parking are applied worldwide namely Multi-level Automated Car Parking, Automated Car Parking System, Volkswagen Car Parking, etc. The present project work is aimed to develop a reduced working model of a car parking system for parking 6 to 8 cars within a parking area of 32.17 m². The chain and sprocket mechanism is used for driving the parking platform and a one fourth hp brake motor shall be implemented for powering the system and indexing the platform. The platform is fabricated to suit the working model. The procurement and manufactured items are in hand and are ready to be assembled with the structure. This model is further useful for different branches of engineering in order to develop different types of automations like PLC, Micro controller and computerization etc. By testing analyzing the working model we can defiantly get the view to develop the parking lots at difficult and busy commercial places. The present project work is completed up to fabrication of different parts and the structure and is ready to be assembled. The final assembly is going on and would be completed step by step shortly.

Keywords: Car Parking, Controller, RFID Reader, Tag.

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I. INTRODUCTION

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. The Rotary Automated Car Parking System (RACPS) belongs to the class of rotary smart car parking systems. The traditional parking systems such as multilevel or multi-store car parking systems (non-automated), robot car parking systems, automated multilevel car parking systems etc have been implemented on a huge scale. But these systems have a major disadvantage of large space consumption which is successfully eliminated with the use of a rotary car parking system [2]. Moreover, the

latter provides the added benefits of flexible operation without the need of an attendant and added security and least chances of vehicle damage. Since the model makes use of composite parts, it is easy to assemble and dismantle and is thus more convenient than the traditional car parking systems. The rotary model is specifically designed to accommodate multiple cars in the horizontal space of two. The structure can accommodate six cars in the space of two and can even be customized to hold a greater number depending upon the requirements of the user and can be efficiently put to use in much space crunched areas. Parking spaces cannot cope with the growth of the number of vehicles.

In many urban housing societies, the parking space ratio is the vehicles parked randomly, cause the major problem faced in most of the metropolitan cities. Mechanical parking equipment is also called stereo garage. As compared to the existing parking arrangements, the most obvious advantage

is maximum space utilization; it is safer and more convenient. The RACPS is totally automated with the user being given a unique ID corresponding to the trolley being allocated to him/her. This kind of equipment is useful to solve the issue of limited parking space available in busy cities. Evidently, it can be seen that the number of private cars is increasing every year. Private garages, where only a single car can be housed at a time, do not provide a feasible solution to the problem since many families own more than one car. So the task was to design mechanical equipment that can store 6 cars in one normal garage. It is called a rotary parking shaft.

II. LITERATURE REVIEW

[1] Muhammad Asyraf Mahmood, Sami Salama Hussen Hajjaj*, "Design and Implementation of a Rotary Parking System for a Truly Smart City" 2018 8th IEEE International Conference on Control System, Computing and Engineering (ICCSCE 2018), 23–25 November 2018, Penang, Malaysia, In this paper, we investigate the existing technologies for automated parking systems and develop a working prototype of a Rotary Parking System, in-line with the Smart-City needs. Drivers can either use buttons, their smart phones, or other identifying methods to park their cars. The paper presents the mechanical design steps, components used, and the programming of the developed system.

[2] Nursalbiah Nasir, Helmi Rashid, "Rotary Car Park (Pallet Design) Computer Aided Design Analysis Study", 2011 IEEE Symposium on Business, Engineering and Industrial Applications (ISBEIA), Langkawi, Malaysia, The increment of vehicle in UiTM main campus had contributed to parking problem because of limited parking space. Hence, rotary parking system could be one of alternative solution. Since it is a big system, this research focuses only on the platform (where cars will be parked on top of it) upper pallet structure. Initial design process stage (conceptual, embodiment and detail design) had been applied to develop CAD model of the parking system.

[3] Madhav Bhagdev, Nitika Agarwal, "Vertically Automated Rotary Parking System", 2017 2nd IEEE International Conference On Recent Trends In Electronics Information Communication Technology, May 19-20, 2017, India, the problem of parking is a big concern by increasing vehicle and adding more congestion on roads of India. To overcome this issue various parking system are also available but this types requires more space not cost effective. So, this project is focused on developing a parking system which is fully automatic and in same context required less space and is cost effective such that 12 cars can be parked in a space of 3 cars only.

[4] Wael Alsafery, Badraddin Alturki, "Smart Car Parking System Solution for the Internet of Things in Smart Cities", IEEE, 2018, The paper presents the mechanical design steps, components used, and the programming of the developed system. Then, the developed system is evaluated. Results show successful implementation of the developed system; a working prototype as well as a simulated system was developed for this work and data show that, indeed, the developed Rotary parking system has the potential to reduce the number of lost man-hours wasted on parking cars and help reduce its related stress, further improving the quality of life there.

[5] Uneb Gazder; Ateqa Shehabi, "Smart parking solution for congested areas: Application of vertical rotary systems" The study adopted one of smart car parking systems (vertical rotary smart car parking). It will be providing the parking area with necessary parks through establishment of number of rotary devices (13 rotors from the most appropriate types) in different appropriate locations. The methodology adopted in this study can be adapted to any environment for solving parking management crisis.

III. PROBLEM STATEMENT

In metropolitan cities, vehicle parking has become a major concern in all busy areas and a good traffic system needs a good parking system. Also fully automatic operating, hence no human error.

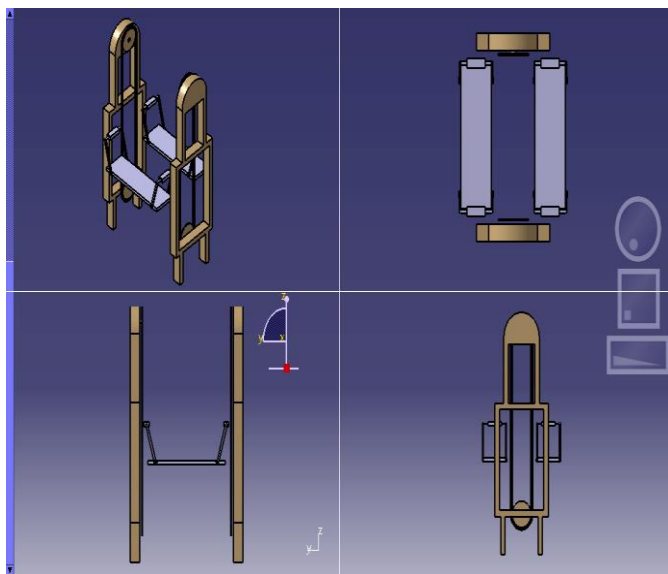
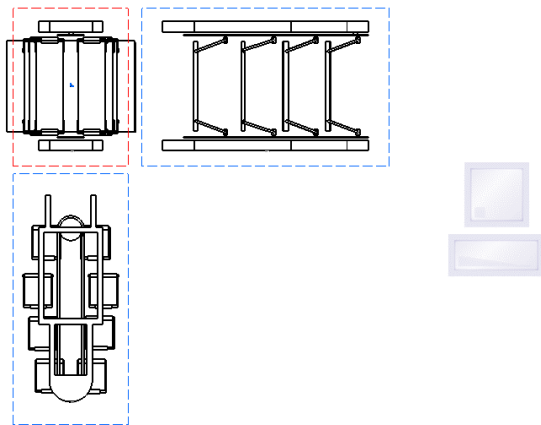
IV. OBJECTIVES

To achieve Safety and security - No property and vehicle damage
 To achieve Save in time, money and fuel - No searching of your car
 To achieve Environment-friendly - Minimize pollution
 To achieve Systematic parking - Can be customized to accommodate any building style and environment
 To minimize Valuable investment - Generate more revenue with lower operation costs and overhead

V. PROPOSED METHODOLOGY

- Studying and identifying the present mechanisms
- Identifying the potential problem through abstraction.
- Collecting useful data.
- Interpreting data as the problem definition
- Developing conceptual design and selecting based on the digital logic approach procedure of product design and development.
- Finally preparing the embodiment design of the product.

VI. SAMPLE DESIGN



VII. OUTCOMES

The model has been designed and all the composite parts in it are manufactured and assembled. It will also minimize the traffic and car safety during parking the vehicle on road.

VIII. CONCLUSION

Our Roto-Parker model has been designed; all the parts in it are manufactured and we are under assembly which will be completed soon. Analysis of the model has to be done when developing a life size model. As the life cycle model involves huge money, proper design and advanced methods are to be used to meet the requirements of the customers. Although we developed working model of the original one, we tried maximum to develop a replica of original and we were compromised only in those stage where the work cannot be completed by assuming or neglecting few factors.

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