



INTERNATIONAL JOURNAL OF ADVANCE RESEARCH, IDEAS AND INNOVATIONS IN TECHNOLOGY

ISSN: 2454-132X

Impact Factor: 6.078

(Volume 7, Issue 5 - V7I5-1320)

Available online at: <https://www.ijariit.com>

Design and analysis of fifth wheel car parking mechanism

Vijay S.

vijay9786067301@gmail.com

SNS College of Engineering, Coimbatore, Tamil Nadu

ABSTRACT

In earlier methods of parking, the time taken is 2 minutes, the driver needs to be more alert while parking in order to avoid hitting of the car during the reverse motion. Therefore, to avoid these inconveniences, a concept of fifth wheel parking is made, where the total time will be 50 to 60 seconds. This parking can be done using an additional wheel fifth wheel. A screw is used to control fifth wheel to land and lift. DC motor enables the forward and reverse motion for the screw. It also helps to know malfunctions during landing or lifting of the wheel. This concept is mainly used for four-wheeler vehicles. This setup makes the vehicle to turn parallel in a significant angle with reference to the front axle within a short period. The model enables the driver to park the vehicle between two vehicles, where the space is limited.

Keywords: Parking System, Screw, Control Unit, additional wheel, DC motors.

1. INTRODUCTION

Parallel parking is a method of parking a vehicle in-line with other parked vehicles. Parallel parking requires initially driving slightly past the parking space, parallel to the parked vehicle in front of that space, keeping a safe distance, and then followed by reversing into that space. Subsequent position adjustment may require the use of forward and reverse gears. Parallel parking is considered to be one of the hardest skills for new drivers to learn. Parallel parking enables the driver to park a vehicle in a smaller space than would be true of forward parking. Driving forward into a parking space on the side of a road is typically not possible unless two successive parking spaces are empty. Reversing into the spot via the parallel parking technique allows one to take advantage of a single empty space not much longer than the car in order to complete the parking within three wheel-turns the parking space would generally need to be about one and a half car length long.

2. PROBLEM STATEMEN

In automobiles, parking system is complicated and time taking to park the vehicle, needs to be more alert while parking in order to avoid hitting of the car during the reverse motion. Therefore, to avoid, a concept of fifth wheel parking is made.

3. STUDY OF AVAILABLE MECHANISMS

By using rack and pinion parking can be done using an additional wheel (an Auxiliary Drive Wheel) most probably this will be a Stepony wheel. Initially, when the driver finds a slot for parking, he pushes the button and the DC motor actuates the movement of rack and pinion. Rack and pinion will be applied force on the one side of triangular hub and due to the pivot point the triangular hub move in angular moment and other side of triangle will lift auxiliary wheel. This will land the auxiliary wheel on the road and slightly lifts the rear side of the vehicle. A rack and pinion and triangular hub set up is used to control an Auxiliary drive wheel to land and lift. The model enables the driver to park the vehicle between two vehicles, where the space is limited.

By using pneumatic and hydraulic cylinder.

The project is consisting of steering rod, rack and pinion gears, pneumatic cylinder, solenoid valve fifth wheel and its supporting wheels. Vehicle steering is controlled by rack and pinion arrangement. Initially, when the driver finds a slot for parking, he can place the front axle of the car in any angle. When the driver pushes the button for the reversing, the solenoid valve actuates the pneumatic cylinder, this will land the fifth wheel on the road and slightly lifts the rear side of the vehicle. The fifth wheel is moved forward /reverse using a DC motor. After parking the vehicle in correct alignment, the fifth wheel is lifted when the cylinder retracts. Simultaneously, the driver gets the status of the process in the display kept in the dashboard of the car. This will help to diagnose the problem during malfunction consists of three wheels. The centre wheel runs with help of motor. This is carried out by us made an impressing task in four wheelers. It is very useful for parking four wheelers, because they need not take any risk for park the vehicle and quick operation. This project will reduce the cost involved in the concern. Project has been designed to perform the entire requirement task at the shortest time available.

4. REASONS BEHIND PARKING ACCIDENTS

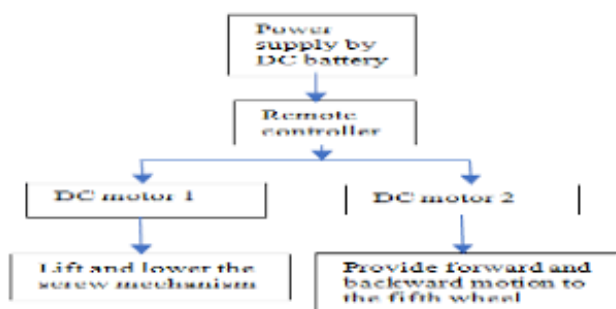
Driver characteristics age, gender, race, and alcohol or drug use, this are the main reasons for accident. Age matter while driving the vehicle while getting proper guessing for parking. Age group of people between 18 to 50 can drive vehicle properly but the age group of 50 to 70 unable to drive vehicle safely because of lack

of decision taking ability. The outcomes demonstrated that drivers significantly affected the likelihood of parking area crashes. Female drivers were around 23 percent bound to be associated with these accidents than male drivers. Utilization of liquor and drugs drivers' basic leadership capacity and loss of vision. Likewise, it decreases readiness and concentration that may result in accidents. Strangely, this factor was observed to be increases up to the 95 %. Environment condition, the impact of lighting conditions, vision impediment, and climate conditions were discovered noteworthy for parking area crashes. Crash affinity was 20% percent lower amid first light and sunset hours than amid daytime. The likelihood of an accident at the point when vision is hindered by trees was observed to be about occasions higher than when vision is unhampered. It was intriguing to find that the chances proportion of accident inclination at parking areas amid overcast, stormy, or foggy climate was lower than in clear/great climate. Maybe individuals drive all the more carefully in severe climate. This causes a lot of accidents.

5. COMPONENTS TO BE USED

1. Lead screw
2. DC motor
3. Wheels
4. Chassis OR Frame
5. Battery

6. BLOCK DIAGRAM



7. WOKING OF MECHANISM

As from the block diagram it is easy to understand the actual working of the fifth wheel car parking mechanism. Battery is a device consisting of one or more electrochemical cells with external connection provided to power to dc motor and other appliances. It is main source of the power in the project having 12-volt capacity.

Remote controller is containing the switches to control the power circuits. It also controls the motor revolution. In the project control unit has two switches and each control the single DC motor motion. DC motor is an important device which helps to move the project. Two DC motor are used in the project. Both motors having 100 rpm revolving capacity but as the project required the less rpm than the 15 to 20 rpm. Hence special type of gear arrangement is used with motor and it reduce its rpm up to 20 rpm. Screw, one DC motor is placed vertically at the end of screw and shaft of the motor is connected with the screw such that when the motor revolve screw starts to revolve. At the same time this screw is revolve in the nut which is connected to the vertical supporter. Supporter connected with the frame of vehicle model. When the screw rotates it lift the whole frame of model like screw jack mechanism. First motor lifts the frame up to some height as 40mm and the stops. Now second motor is operated with the control unit. Second DC motor is placed at the other end of the screw at the perfectly perpendicular direction. At the shaft

of the second DC motor fifth wheel is fixed. Fifth wheel of also has the perpendicular direction of motion with respect to the other four wheels. Fifth wheel has the back and forward motion with the help of the motor. As the mechanism is placed at the rear end, it oscillates the rear end of the frame. When the displacement of the rear end is done then again first motor revolve in anticlockwise direction and it lift the fifth wheel up to specific distance height and frame is placed on the other two wheels. In this way the operation is performed.

8. ADVANTAGES

- This made the parking easy.
- Less time required to park the car.
- It is very cheap as components like sensors, ECU, hydraulic pump etc are not used.
- Construction of mechanism is easy.

9. SCOPE FOR FUTURE

- As per recent condition the people will get problem for the parking space because the in cities, Restaurants, Cinema halls where people regularly use to visit, they required the space to park the vehicle between to two vehicles in less space. This mechanism overcome this type of problem.
- Time required for parking the vehicle between the two vehicle is more. And drive should have conscious otherwise the vehicle gets smashed with the other one. Where the fifth wheel car parking mechanism is time efficient and safe.
- This parking mechanism is cheap in cost because it does not require any sensors and costly ECU. It is just simple mechanism.

10. CONCLUSION

This project report on the Fifth Wheel Car Parking Mechanism is to improve the parking system with less cost. It define the time saving while car parking in the crowded area. It also introduces a method to eliminate the complex mechanism which is used in recent cars with number of sensors and complicated microcontrollers.

ACKNOWLEDGEMENT

We would like to thank our principal Dr. Ritesh Patil and our guide Prof. S.S. Shirsath for their wonderful guidance and help on this project.

REFERENCES

- [1] Mr. Paresh G. Chaudhary, Mr. Sanket R. Avhad, Mr. Omkar P. Dharpale, Mr. Ganesh R. Dhumal, "Auxiliary Drive Wheel Vehicle Parking Mechanism (Fifth Wheel Car Parking Mechanism)", *International Journal of Pure and Applied Mathematics*, Volume 118 No. 24 2018.
- [2] Priyadharshini R, Indumathi T, Pavithra M, Rinipriya T, Sahaana V, "Parallel Parking of Car using fifth wheel", *International Journal of Innovative and Emerging Research in Engineering*, Volume 4, Special Issue 1, NCIAR2k17.
- [3] Atul A Dhawale, Rohitkumar R Gupta, Shubham A Gawande, Yogesh D Bate, and Prof. VS. Nikam, "Design and Fabrication Automatic Pneumatic Inbuilt Jack System by using Fifth Wheel Parking System", *IJSRD - International Journal for Scientific Research & Development* | Vol. 5, Issue 01, 2017.
- [4] K. R. Prabhu, S. Gokulraj, L. Jeeva, M. Leon Richardson, and R. Manikandan, "Fabrication of parallel car parking using 5th wheel", *EPH - International Journal of Science and Engineering*, 2016.
- [5] Janhvi Nimble, Priyanka Bhegade, Snehal Surve, and Priya Chaugule, "Automatic Smart Car Parking System",

International Journal of Advances in Electronics and Computer Science, Volume-3, Issue-3, Mar.-2016.

- [6] Muhammad Faiz Bin Wahab, Aung Lwin Moe, Aminudin Bin Abu, Zulkifli Bin Yaacob and Ari Legowo, "Development of automated parallel parking system in small mobile vehicle", ARPN Journal of Engineering and Applied Sciences, VOL. 10, NO. 16, SEPTEMBER 2015.
- [7] Viktor Zadachyn, Oleksandr Dorokhov, "Calculation of optimal path for parallel car parking", Transport and Telecommunication, 2012.