Parallel Parking of Car using fifth wheel

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ABSTRACT:
In earlier methods of parking, the time taken is 2 minutes (approx), the driver needs to be more alert while parking in order to avoid hitting the car during the reverse motion. Therefore to avoid these inconveniences, a concept of parallel 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 pneumatic cylinder and solenoid valve setup is used to control fifth wheel to land and lift. A DC motor enables the forward and reverse motion for the fifth wheel. A digital display is used to indicate the status of the wheel for the driver reference. 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: Solenoid valve, Pneumatic cylinder, DC motor, Fifth wheel.

I. 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, (hence the term 'Parallel Parking'), 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). New drivers learn to use reference points to align themselves in relation to the car in front of the space, to determine the proper angle for backing, and to determine when to turn the steering wheel while backing. They may find it easier to briefly stop at each reference point and turn for the next step.

Two major types of parallel parking technique differ in whether they will use two or three positions of the steering wheel while backing. A skilled driver may be able to parallel park successfully by backing with the steering wheel turned all the way to the left (or right, in left-hand drive countries or when parking on the left side of a one-way street) and then immediately cranking the wheel all the way to the right (or left, in left-hand drive countries or when parking on the left side of a one-way street) at a critical point. For beginning drivers, those with larger cars or bad sight lines, this may risk collision with either the car in front of or behind the parking space, or it could also result in the car being parked too far away from the curb. Such drivers may find it easier to include an intermediate step, where after having achieved the ideal angle for backing up they back up with the wheels straight until the rear end of the car is far enough back to allow them to make their final reverse turn. While steering wheel positions in between full-right, straight, and full-left are possible to use, beginners may be able to gauge their progress more effectively by turning the wheel all the way to the right or left.

A 2009 Ruhr University Bochum study argued that a driver's gender may affect parking ability. According to the research, female drivers took an average of 20 seconds longer to park than male drivers, yet were still less likely than men to park accurately.

II. BACKGROUND STUDY
Roads that facilitate parallel parking have an extra lane or a large shoulder for parked cars. It is also employed whenever parking facilities are not available usually in large metropolitan areas where there is a high density of vehicles and few (or restricted) accommodations such as multi-stored car parks.

Many jurisdictions restrict parallel parking during rush hour, freeing up an extra traffic lane. Historically, metered parallel parking had individual meters for each parking spot with spots clearly marked on the road. Some jurisdictions have eliminated individual spots allowing shorter vehicles to use less space. Individual
meters are then also replaced with a centralized parking ticket machine. Beyond taking up a lane of traffic, on-street parking further reduces road capacity as remaining traffic slows to interact with cars moving in and out of parallel parking spaces, car doors opening and pedestrians.

Parking facilities include indoor and outdoor private property belonging to a house, the side of the road where metered or laid-out for such use, a parking lot or car park, indoor and outdoor multi-level structures, shared underground parking facilities, and facilities for particular modes of vehicle such as dedicated structures for cycle parking. After the first public parking garage for motor vehicles was opened in Boston, May 24, 1898, livery stables in urban centers began to be converted into garages. In cities of the Eastern US, many former livery stables, with lifts for carriages, continue to operate as garages today.

Automatic parking is an autonomous car maneuvering from a traffic lane into a parking place to perform parallel parking, perpendicular or angle parking. The automatic parking aims to enhance the comfort and safety of driving in constrained environments where much attention and experience is required to steer the car. The parking maneuver is achieved by means of coordinated control of the steering angle and speed which takes into account the actual situation in the environment to ensure collision-free motion within the available space. The car is an example of a non holonomic system where the number of control commands available is less than the number of coordinates that represents its position and orientation. One of the first experimental prototypes of automatic parallel parking was developed at INRIA on a Ligier electric car in the mid 1990s. It was extended to an automatic perpendicular parking in the early 2000s.

Automatic parking systems are being developed by several automobile manufacturers. A commercial version of automatic parallel parking was introduced by Toyota Motor Corporation in Toyota Prius in 2004. BMW recently demonstrated its Remote Park Assist system on a 750i. This system initiates parking by keychain remote. Lexus also debuted a car, the 2007 LS, with an Advanced Parking Guidance System. As well in 2007 the V W Touran debuted with an automatic parking system developed by Valeo.

### III. BLOCK DIAGRAM

![Block Diagram](image)

The power supply for the electronic components and switches are supplied from the battery. A driver is an electrical circuit or other electronic component used to control another circuit or other component, such as a high-power transistor. The driver circuit will allow you to drive a 12V relay using logic voltage. The circuit has its own 12V power supply making it self contained but the power supply portion can be left out if an external supply will be used. The circuit shows an output from the power supply that can be used to power other devices but it should be noted that the supply is unregulated and not particularly powerful with the parts stated. The 12V DC output is suitable for powering a few LEDs or low voltage lights but should not be used to power other electronic boards or motors. A relay is an electrically operated switch. Current flowing through the coil of the relay creates a magnetic field which attracts a lever and changes the switch contacts. Solenoid valves are the most frequently used to control the elements in fluidics. A solenoid valve has two main parts: the solenoid and the valve. The solenoid converts electrical energy into mechanical energy which, in turn, opens or closes the valve mechanically, the pneumatic cylinder is used to move the fifth wheel up and down, the supply is also given to the switches which is used to control the movement of the vehicle. the DC motor is used to make the fifth wheel rotation.

### IV. WORKING

The project is consists 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 push 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 helps to diagnose the problem during malfunction consists of three wheels. The centre wheel runs with help of motor.

V. CONCLUSIONS

The 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,

REFERENCES