

Fifth Wheel Drive System

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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 of 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 set up 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—Fifth wheel drive, Automotive, Prototype.

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).

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

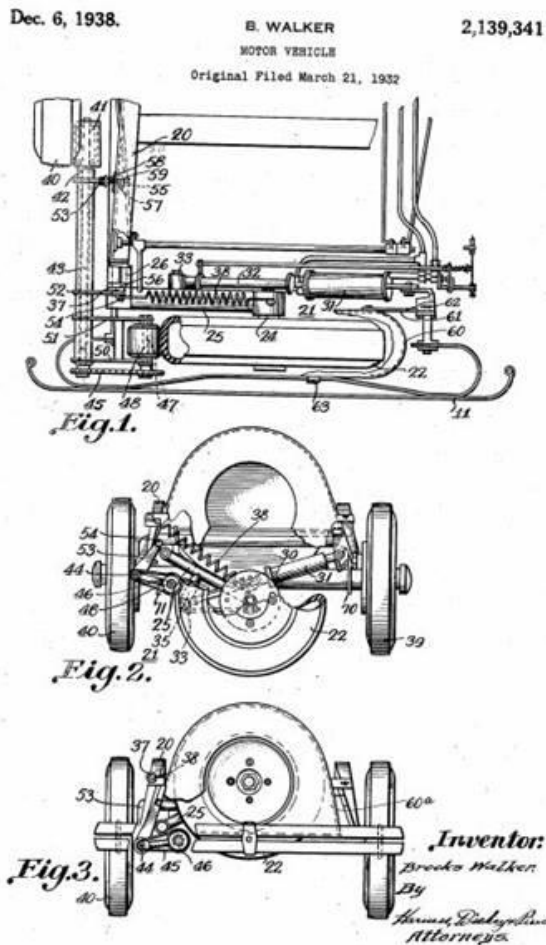
metropolitan areas where there is a high density of vehicles and few (or restricted) accommodations such as multi store car parks. Many jurisdictions restrict parallel parking during rush hour, freeing up an extra traffic lane. Historically, metered parallel parking had individual meters for each parking 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.

II. BACKGROUND

So, let's step back in time to consider a nifty innovation that made it much easier to squeeze into a tight spot. Back in the 1950s, a man named Brooks Walker invented "fifth-wheel driving," wrote Old Cars Weekly. The system utilized a hydraulic pump and the car's spare tire to guide the vehicle in and out of parking spaces. It could also turn the car in a complete circle. Walker created a prototype on his own Packard Cavalier. (He was from the San Francisco Bay Area, where the steep streets can make parallel parking especially tricky.) Walker demonstrated "fifth-wheel driving" at numerous auto shows. "With new cars getting bigger and parking spaces getting smaller ... an inventor has developed something to soothe the motorist's headache," a newsreel narrator enthused. But the big car companies didn't jump on the bandwagon. The inventor apparently spent the next 20 years tinkering with the idea, with the ultimate goal of making the system "a bolt-on kit that could be applied to any car without changes to its basic structure," Old Car Weekly wrote. Watch the video below to see how Fifth-Wheel Driving worked. Before long he was making the rounds again, this time demonstrating his park assist device on a 1953 Packard Cavalier and taking advantage of an extended continental kit to mount the fifth wheel outside the trunk. Using a series of gears and hydraulic pumps and lines, Walker's system could be activated with the

push of a button beneath the dash. Surprisingly, Detroit said no again.

Walker continued to perfect his parallel parking system into the 1970s, but he died without ever realizing his dream—a dream that is now reality. So, the next time you take your hands off the wheel of your Chevy Malibu as it methodically parallel parks itself, give thanks for Brooks Walker.



		having no. of wires are connected
3	ROCKER SWITCH BOX.	It is a fabricated box in which rocker switches are fixed.
4	ALUMINIUM FRAME.	Size is 1*1.5 feet and it is light in weight.
5	WOODEN BOARD	Size of wooden board is same as aluminum frame having 1*1.5 feet. It is bad conductor of electricity.
6	DUMMY WHEELS.	It is a shaft of wheel and wheel are mounted on dummy wheel.
7	WHEELS.	It is 6-8 cm diameter. Used to move the robot.
8	Wires	No. of colors of wires having 1 mm thickness it is aluminum wires

A. DC MOTOR

A DC motor is any of a class of rotary electrical machines that converts direct current electrical energy into mechanical energy. The most common types rely on the forces produced by magnetic fields. Nearly all types of DC motors have some internal mechanism, either electromechanical or electronic, to periodically change the direction of current flow in part of the motor. It is used for moving the fifth wheel attached for making the 360-degree turns.

B. ROCKER SWITCH

A rocker switch is an on/off switch that rocks (rather than trips) when pressed, which means one side of the switch is raised while the other side is depressed much like a rocking horse rocks back and forth. A rocker switch may have a circle (for "on") on one end and a horizontal dash or line (for "off") on the other to let the user know if the device is on or off. Rocker switches are used in surge protector s, display monitors, computer power supplies, and many other devices and applications

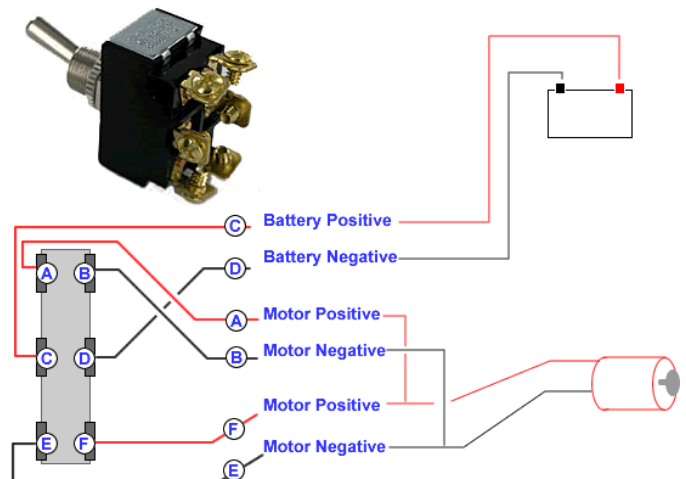
A rocker switch with independent circuitry can have a light activated on the face of the switch in both the on and off positions, which allows the switch to be found easily in the dark. With dependent circuitry, the light is activated only when the switch is on.

III. MOTIVATION

To make a working model of Fifth wheel drive, for an ease of parallel parking in cities and uneven road conditions. A vehicle featuring low cost and user-friendly steering mechanism for Auxiliary wheel has been introduced. This paper focused on a steering mechanism which offers feasible solutions to a number of current maneuvering limitations. A prototype for the proposed approach was developed by introducing separate mechanism for normal steering purpose and 360-degree steering purpose. This prototype was found to be able to be maneuvered very easily in tight spaces, also making 360° steering possible.

IV. MATERIALS USED FOR PRTOTYPE

Sr. no.	Component	Features
1	DC – MOTOR	It's a 30-rpm dc motor, it is used drive robot wheel
2	ROCKER SWITCH	It is a one of the types of switch



C. ROCKER SWITCH BOX

It is used for the connection of the rocker switches in a combined form. We have arranged the five rocker switches in a one box for better operation. Rocker switches are popular among gadgets like computer printers, UPS, SMPS etc. Used solely for the purpose of shifting device operation from ON to OFF, rocker switches can be engaged or disengaged with a small force. Rocker switches are available in various types and sizes depending on the power requirements of the device they are used in. They often come with a light source mounted beneath the actuator to indicate the ON state.

D. ALUMINIUM FRAME

Aluminium is a chemical element in the boron group with symbol Al and atomic number 13. It is a silvery white, soft, nonmagnetic, ductile metal. By mass, aluminium makes up about 8% of the Earth's crust; it is the third most abundant element after oxygen and silicon and the most abundant metal in the crust, though it is less common in the mantle below. Aluminium metal is so chemically reactive that native specimens are rare and limited to extreme reducing environments. Instead, it is found combined in over 270 different minerals. The chief ore of aluminium is bauxite.

E. WOODEN BOARD

Engineered wood, also called composite wood, man-made wood, or manufactured board, includes a range of derivative wood products which are manufactured by binding or fixing the strands, particles, fibres, or veneers or boards of wood, together with adhesives, or other methods of fixation to form composite materials. These products are engineered to precise design specifications which are tested to meet national or international standards. Engineered wood products are used in a variety of applications, from home construction to commercial buildings to industrial products. The products can be used for joists and beams that replace steel in many building projects.

F. DUMMY WHEELS

Suitable for Robot, car or any vehicle building and other hobby projects. If you want to fix your wheels in your robot then this is the best solution for it.

G. WHEELS

Robot wheels or poly wheels, similar to Mecanum_wheels, are wheels with small discs around the circumference which are perpendicular to the turning direction. The effect is that the wheel can be driven with full force, but will also slide laterally with great ease. These wheels are often employed in holonomic drive systems.

H. WIRES

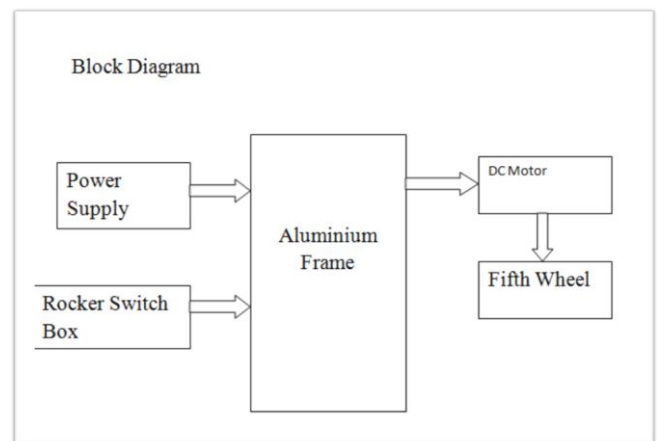
Wire is a basic component used in any of those electronic and electrical equipment's. Let us see what a wire is, different types of wires, what cables are, etc. In simple terms, wire is usually a cylindrical string of metal used to carry electricity or other signals from one end point to another. They are

generally covered with an insulating material such as plastic or other rubber resembling polymers, or simply a varnish. They are very rigid, but are inexpensive with very less resistance. Copper is widely preferred metal in wires due to the reason that resistance in copper is less compared to other metals within an expense range. Of course, silver and gold offer better conductivity, but they do come at their own luxurious cost.

V. FEATURES OF MATERIALS

Features of Materials		
Sr. no.	Component	Features
1	Dc – Motor	It's a 30-rpm dc motor, it is used drive robot wheel
2	Rocker Switch	It is a one of the types of switch having no. of wires are connected
3	Rocker Switch Box.	It is a fabricated box in which rocker switches are fixed.
4	Aluminum Frame.	Size is 1*1.5 feet and it is light in weight.
5	Wooden Board	Size of wooden board is same as aluminum frame having 1*1.5 feet. It is bad conductor of electricity.
6	Dummy Wheels.	It is a shaft of wheel and wheel are mounted on dummy wheel.
7	Wheels.	It is 6-8 cm diameter. Used to move the robot.
8	Wires	No. of colors of wires having 1 mm thickness it is aluminum wires

VI. CONSTRUCTION OF FIFTH WHEEL DRIVE



All four wheels are fixed in each four side with help of dummy wheel. In dc motor rocker switch wiring are solder and rocker switch give connection on external sources. The fifth wheel are attached to aluminium frame with dc motor.

VII. WORKING OF FIFTH WHEEL DRIVE

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 center wheel runs with help of motor. An automatically retractile

assembly for article of furniture in vehicles that, once motivated, causes associate auxiliary wheel to exerting a rubbing force and park in restricted areas like parking slots. Aim for development of a system to show the vehicle base frame at zero to 360-angle. DC motor used for driving Vehicle model. Chain and sprocket or DC motor arrangement can transfer the ability from motor to vehicle axel. At the rear side we are going to provide auxiliary drive wheel on perpendicular plane of four wheels. Triangular pivot principal used for folding of an auxiliary drive wheel. As shown in rack and pinion will applied force on the one side of triangular hub. Due to the pivot point on the top of the triangle, other side of triangle will lift the fifth wheel. For the actuation of rack DC motor will provided at the pinion. Hence whenever needed operated must have unfold the fifth wheel axel by liner actuator (Rack and Pinion). In the normal drive the vehicle will travel with the normal four wheels whereas during the parallel parking the fifth wheel comes to action and the remaining two rear wheels will be not in contact with the ground.

VIII. APPLICATIONS

- i. Used for easy parking in four wheelers
- ii. It is applicable for all four wheeled vehicles.

IX. ADVANTAGES

- i. Easy Maintenance
- ii. Change in mode is Easy
- iii. Applicable in every 4 wheeler
- iv. To obtain better parking in narrow space and at multiplexes.
- v. To obtain 0 to 360 degree turning with zero turning radius.
- vi. Resolve Traffic Problems.
- vii. Vehicle parking and driving in city conditions with heavy traffic in tight spaces.
- viii. This type of car can be taken through traffic jam.
- ix. Saving of Time.

X. DISADVANTAGES

- i. Additional wheel is required
- ii. Extra space is required
- iii. Less boot space

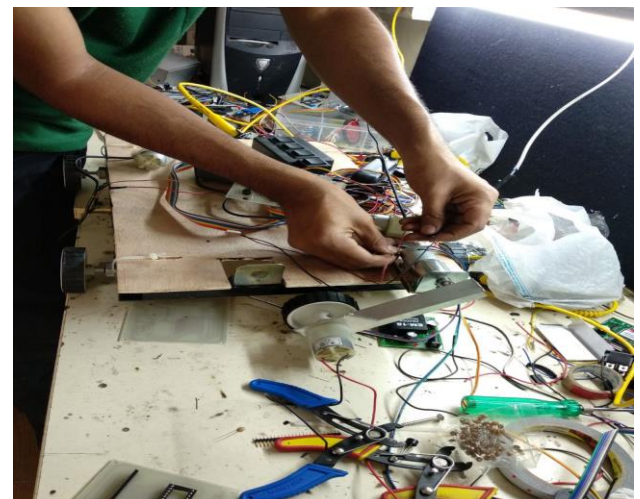
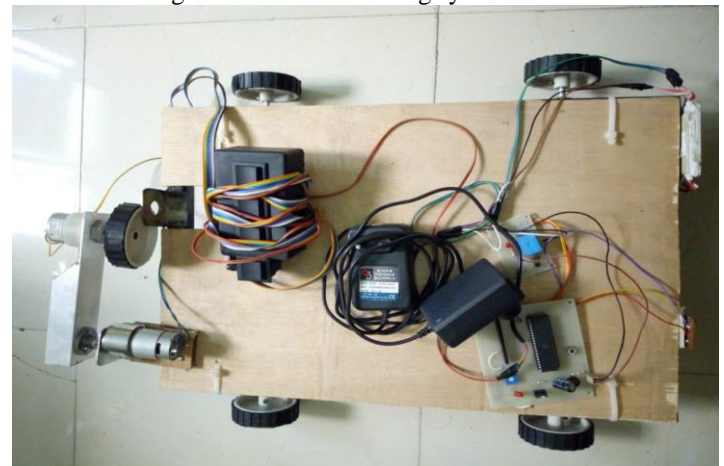
XI. CONCLUSION

The project carried out by us made an impressive task in the field of automobile industries. It is very usefully for driver while driving the vehicle and parking the vehicle. This project has also reduced the cost involved in the concern. Project has been designed to perform the entire requirement task which has also been provided.

A vehicle featuring low cost and user-friendly steering mechanism for Auxiliary wheel has been introduced. This paper focused on a steering mechanism which offers feasible solutions to a number of current maneuvering limitations. A prototype for the proposed approach was developed by introducing separate mechanism for normal steering purpose and 360-degree steering purpose. This prototype was found to be able to be maneuvered very easily in tight spaces, also making 360° steering possible.

XII. FUTURE SCOPE

- i. Aim for development of a system to useful in the automotive sector.
- ii. Four bar mechanism will be implementing for working of fifth wheel, our aim is to fold the fifth wheel axel for better space adaptability.
- iii. Hence whenever needed operated must have unfold the fifth wheel axel by actuating rack and pinion.
- iv. Arrange conventional steering system at front side.



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