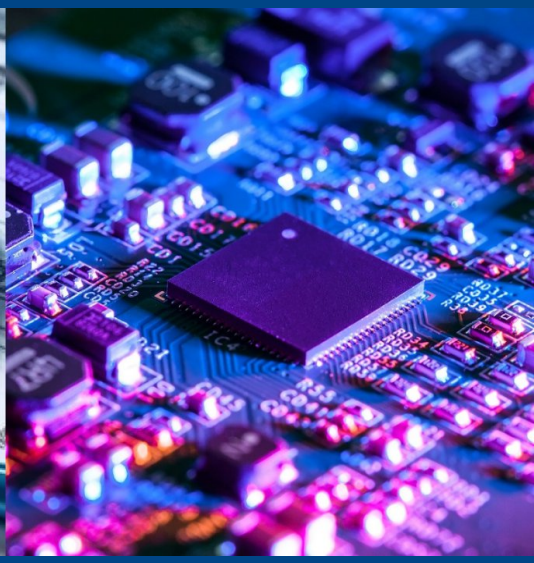
ISSN: 2582-7219





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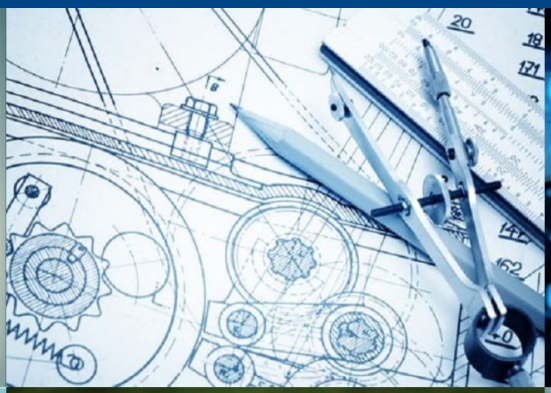

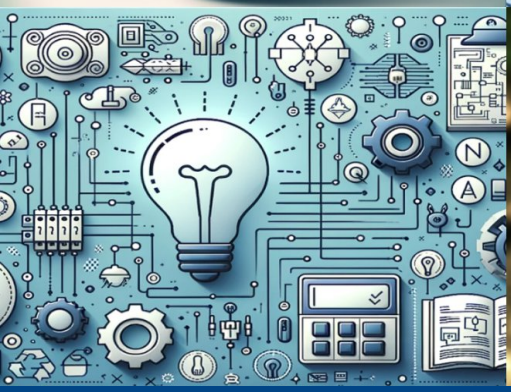

Impact Factor: 8.206 **Volume 9, Issue 4, April 2026**

© 2026 IJMRSET | Volume 9, Issue 4, April 2026 | DOI:10.15680/IJMRSET.2026.0904336

ISSN: 2582-7219 | www.ijmrset.com | Impact Factor: 8.206| ESTD Year: 2018|

International Journal of Multidisciplinary Research in Science, Engineering and Technology (IJMRSET)

(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)

Design & Fabrication of Zero Turn Mechanism

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ABSTRACT: This project provides design and fabrication of four mode four wheel steered multi- utility vehicle. Four-wheel steering is a system that allows the rear wheels to turn for maneuvering, rather than just follow the front wheels. It is a system employed by some vehicles to decrease turning radius. This would be very useful in industrial areas with less floor space. In addition, with four wheels steering the vehicle is a multiutility vehicle, so it is used for scrap collecting, shifting etc. The conventional floor cleaning machines were not fast, efficient and of high cost. Hence it is a need to develop low-cost, user-friendly floor cleaning machine. Phase or opposite-phase and it produce a sharper, tighter turn.

KEYWORDS: Zero Turn Mechanism; Four-Wheel Steering Rack and Pinion; Bevel Gear; Spur Gear; Automotive Differential; Tie Rod;Multi-Utility Vehicle; Floor Cleaning Machine; Scrap Collecting Vehicle; Industrial Applications; Railway Platforms; Parking Area Maneuverability; Mild Steel Frame; Economical Vehicle Design; Flexible Operation.

I. INTRODUCTION

Four-wheel steering provides a means to actively steer the rear wheels during turning maneuvers. It improves handling and helps the vehicle to make tighter turns. If a car could automatically compensate for an under steer /over steer problem, the driver would enjoy nearly neutral steering under varying conditions. When both the front and rear wheels steer toward the same direction, they are said to be in phase and this produces a kind of sideways movement of the car. When the front and rear wheels are steered in opposite direction, this is called anti-phase, counter.

II. LITERATURE SURVEY

Shelke et al. (2022) demonstrated zero-turn steering using tie rod and Arduino control for tight space maneuverability. M.K. Deshmukh et al. (2016) explained four-wheel independent steering systems enabling rotation around the center of gravity. These studies highlight that zero-turn systems improve maneuverability but require precise mechanical control.

III. METHODOLOGY

The development process includes:
· Identify the requirements
· Selection of steering mechanism
· Literature review
· Problem identification
· Modeling of parts
· Fabrication of the model with designed dimensions

IV. MATERIAL SPECIFICATION (OR) USED

I. **BASIC FRAME**:
- The hollow square pipes of material of Mild steel are selected for frame.
- The pipes are cut into required size by cutting machine

II. RACK AND PINION MECHANISM:
- The rack and pinion arrangement converts rotatory motion into linear motion.
- The circular gear called "THE PINION" engage teeth on a linear gear bar called "THE RACK".

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III. STEER TRANSMISSION CASE:

- The Steer transmission case consists of 3 bevel gears and 4 spur gear.
- It allows driver to convert 4-wheel steering system to 2-wheel steering system and vice-versa.

IV. AUTOMOTIVE DIFFERENTIAL:

- The automotive differential is designed to drive a pair of wheels while allowing them to rotate at different speed.
- It is used to transmit the power from drive shaft to the drive wheels.

V. TIE ROD:

- The tie rod is a part of the steering mechanism in a vehicle.
- The tie rod transmits force from the rack gear to steering knuckle, this will cause wheel to turn.

V. RESULTS AND DISCUSSION:

The fabricated model successfully demonstrates:
·360-degree wheel rotation
·Efficient turning in minimal space
·Reduced turning time
·Applicability in industrial environments

VI. CONCLUSION

A model for the proposed approach was created by acquainting controlling and manual operator with wheel turn 360 degree. This model was seen as ready to be moved effectively in tight spaces, and after production of 360 degree wheel pivot vehicle devoured less space to turn from one direction to another direction and it consumes less time to turn and this vehicle used in various area such as small industries, railway platforms and in a parking area This project is made with pre planning, that it provides flexibility in operation. This innovation has made the more desirable and Economical.

This project "design and fabrication of zero turn mechanism" is designed with the hope that it is very much economical and help full to vehicles for parking and other purpose. This project helped us to know the periodic steps in completing a project work. Thus we have completed the project successfully.

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