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Four Wheel Steering with Zero Radius Turning Vehicle

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Abstract: *Conventional two-wheel steering vehicles face limitations in maneuverability, especially in congested urban environments and during parking. This work presents the design and development of a Four Wheel Steering (4WS) vehicle with Zero Radius Turning capability to overcome these limitations. The proposed system integrates multiple steering modes—two-wheel steering, four-wheel steering, and zero-degree turning radius—within a single vehicle using a mechanically actuated arrangement. Dual rack-and-pinion steering columns, interconnected through a steering shaft and knuckle joints, along with a modified bevel gear differential, enable effective rear-wheel steering and counter-rotation during zero-radius turns. Experimental results show a significant reduction in turning radius from 235 cm to 178 cm, along with improved maneuverability and stability. The system offers a practical and cost-effective solution for vehicles operating in tight spaces.*

Keywords: Four Wheel Steering (4WS), Zero Radius Turning, Vehicle Maneuverability, Steering Mechanism, Modified Differential, Turning Radius Reduction, Rack and Pinion Steering

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