

Design and Development of a Six-Legged Walking Hexapod Robot

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Abstract

This project presents the development of a hexapod robot engineered for dynamic, terrain-adaptive locomotion and stable horizontal posture control. Equipped with 18 serial bus servos and controlled by an ESP32 microcontroller, the system implements real-time inverse kinematics and feedback-driven gait generation. A dedicated PID controller maintains balance across the horizontal plane during walking and uneven surface traversal. The robot communicates wirelessly and supports flexible gait strategies, enabling precise and coordinated leg motion for advanced mobility. The system features closed-loop control and is designed for practical deployment in legged robotic applications.