

Design and Implementation of an RF-Controlled Rocker-Bogie Mechanism for Multi-Terrain Navigation and Tactical Defense Applications

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Abstract: This paper details the design, mechanical configuration, and electronic architecture of a multi-terrain Rocker-Bogie mobility mechanism. The system leverages a six-wheel configuration driven by 100 RPM DC gear motors to achieve efficient obstacle traversal and step-climbing capabilities without traditional suspension springs. Power delivery is managed via a 12V Lithium-Ion battery pack configured by connecting three individual cells in series. System navigation and operational commands are transmitted wirelessly using a 433 MHz RF Module coupled with HT12E/HT12D encoder-decoder ICs and an integrated relay switching network. Empirical testing validates that the system effectively navigates highly irregular topographies, climbs inclines up to 45 degrees, and supports tactical payloads such as laser targeting modules and AV recording equipment. The design offers a low-cost, scalable framework for military operations, material handling, and hazardous exploration.

Keywords: Genetic Algorithm (GA), selective harmonic elimination, dc sources.