
Arduino-Powered Portable Motorized Car Lifter: An Intelligent Solution for Ergonomic Vehicle Lifting

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Abstract

Vehicle maintenance tasks such as tire replacement often require car-lifting tools that are physically demanding and time-consuming. Traditional manual jacks, though affordable, pose ergonomic challenges and safety risks, especially for users with limited physical strength. On the other hand, advanced automated lifting systems remain financially inaccessible to many small-scale workshops and individual users. This research aims to design and develop a smart, portable electro-hydraulic car jack system controlled by Arduino, offering a safer, faster, and user-friendly alternative. The main objective of this project is to automate the vehicle-lifting process using a motorized hydraulic jack integrated with Arduino-based control, sensors, and DC motors. The system is powered by a 12V car battery, making it suitable for both workshop and roadside use. The development follows the Agile methodology, encompassing planning, design, prototyping, testing, and user feedback phases. An ultrasonic sensor and LED indicators were used to enhance safety and provide operational feedback. Testing results demonstrate that the proposed system requires only 45 Nm of torque to lift a vehicle, compared to 70 Nm for a manual scissor jack. It also achieves a lifting height of 50 cm within 1 minute and 48 seconds, significantly faster than conventional tools. The findings confirm improved efficiency, reduced physical strain, and greater user accessibility. In conclusion, this Arduino-powered electro-hydraulic jack offers a practical and cost-effective solution for safe vehicle lifting. It is particularly advantageous for users in emergency scenarios and for workshops seeking a low-cost automation upgrade.

Keywords : *Arduino; Mobile jack; Automotive*
