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Electric Vehicle Overload Detection and Alert System using Arduino

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Abstract: *The increasing adoption of electric vehicles (EVs) has promoted sustainable and eco-friendly transportation. However, overloading remains a major issue in lightweight EVs such as e-bikes and tricycles, leading to reduced battery efficiency, increased power consumption, mechanical stress, and safety risks. Most existing EVs lack a real-time system to detect and alert users about overload conditions.*

This project, "Electric Vehicle Overload Detection and Alert System Using Arduino" proposes a low-cost and reliable solution to monitor vehicle load and enhance safety. The system employs a strain gauge load cell to measure the applied load, and an HX711 amplifier to amplify and digitize the sensor output. An Arduino UNO microcontroller processes the data and continuously compares it with a predefined threshold. When an overload condition is detected, the system alerts the user through a buzzer and displays real-time load and mileage information on a 16×2 LCD display.Additionally, the system calculates mileage before and after overload, allowing users to analyze the impact of excess load on vehicle efficiency. A two-stage power regulation circuit using LM2596 and LM7805 ensures a stable 5V supply from the vehicle's 24V battery. Experimental results confirm accurate overload detection and reliable operation. The proposed system improves safety, efficiency monitoring, and vehicle reliability, making it suitable for low-speed and lightweight electric vehicles.

Keywords*:* Electric Vehicle (EV) Overload Detection, Arduino UNO, Load Cell (Strain Gauge), Buzzer Alert System

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