PROJECT ABSTRACT

Motorized Scissor Lift Working Model

A motorized working model of a scissor lift: 12 V geared motor driving a lead screw, limit-switch travel protection and Arduino push-button control. Delivered built-to-order with working model, firmware, load-test procedure, report, PPT and viva kit.

01. Title

Motorized Scissor Lift Working Model

02. Introduction / Background

Scissor lifts are everywhere in industry — car service lifts, warehouse order pickers, aerial work platforms — because the scissor linkage converts a short horizontal actuator stroke into large, stable vertical travel while keeping the platform level. The mechanism looks simple but its kinematics and force requirements are genuinely instructive: the actuator force needed changes with lift angle, which is why real scissor lifts struggle most at the bottom of travel. This project builds a motorized working model: a 12 V geared motor drives a threaded screw rod through a nut block, limit switches bound the travel, and an Arduino with a motor driver provides interlocked up/down/stop control.

03. Problem Statement

Students study four-bar and scissor mechanisms as static diagrams, never measuring how force, speed and current actually vary through the stroke. The project addresses this with a working motorized model plus a load-test procedure — the student times lifts at several payloads, logs motor current and records platform deflection, turning the mechanism into a real experimental study with measured data for the report.

04. Objectives

- Fabricate a bolted-steel scissor linkage with base frame and level platform.
- Drive the linkage with a 12 V geared motor through a self-locking lead-screw drive.
- Protect travel with top and bottom limit switches.
- Implement Arduino push-button control with debounce and direction interlocking.
- Provide a load-test procedure: lift time, motor current and deflection vs payload.
- Deliver the complete student kit: model, firmware, test procedure, report, PPT and viva Q&A.;

05. Proposed Methodology

The model is built in three stages. (1) Mechanism: bolted scissor arms with pivot bushings assemble on a plywood/steel base with a wooden platform; the screw-drive subassembly (motor, coupling, threaded rod, nut block) mounts at the base. (2) Control: an Arduino with an L298N driver implements up/down/stop with debounced buttons, direction interlocking and limit-switch cutoffs plus a latching emergency stop. (3) Experiment: the student runs the load-test procedure at several payloads, recording lift time, current and deflection for the report's analysis of force-vs-angle behavior and speed-vs-load curves.

06. System Architecture / Working

The up button runs the motor one way; the nut block travels along the screw and pulls the base pivots of the scissor arms together, raising the platform. Down reverses the motor and the platform lowers under control. Limit switches cut the motor at both travel ends regardless of button state; the emergency stop overrides everything. The lead screw is self-locking, so the platform holds position with no power — a key scissor-lift property the student demonstrates directly.

07. Hardware / Software Requirements

- 12 V DC geared motor (approx. 30 rpm) with flexible coupling
- Threaded screw rod with nut block (lead-screw drive)
- Bolted steel scissor arms with pivot bushings
- Arduino Uno + L298N motor driver
- Microswitch limit switches (top and bottom)
- Up/down/e-stop push-button station
- 12 V DC supply input
- Arduino IDE (C/C++ firmware)

08. Expected Outcomes

- A working motorized scissor lift model with protected, interlocked controls.
- Measured lift-time, current and deflection data at several payloads.
- A documented self-locking hold demonstration.
- A complete report, PPT and viva Q&A; on scissor kinematics and experimental results.

09. Applications

- Teaching mechanism kinematics and mechanical advantage in machine-design labs.
- Demonstrating lead-screw actuation and self-locking.
- A base for extensions: position feedback, load-cell instrumentation.

10. Future Scope

- Encoder-based position control with preset heights.
- Load-cell instrumentation for direct force measurement.
- Multi-stage scissor stack for greater lift height.
- Battery-powered mobile variant.