PROJECT ABSTRACT

Coconut Tree Climbing Robot with Remote Control

A tree-climbing robot for coconut palms: a spring-loaded frame with gripper wheels driven by DC gear motors climbs a trunk model under RF remote control. Delivered built-to-order with robot, trunk model, remote, firmware, report, PPT and viva kit.

Project type: Hardware

Availability: Built to order

Suitable branches: Mechanical

Technologies: DC gear motors, rubber gripper wheels, spring-loaded aluminium frame, RF remote, Arduino-class controller, H-bridge driver, Li-ion pack

Price: Request a quotation

Prepared by Projectech · projectech.in — for academic project reference.

01. Title

Coconut Tree Climbing Robot with Remote Control

02. Introduction / Background

Harvesting coconuts means climbing 15-metre palms by hand — skilled, dangerous work with a real injury record. A climbing robot that grips the trunk and carries a tool or camera up the tree is a classic mechatronics challenge: it must generate enough normal force to grip without slipping, enough torque to lift its own weight, and stay stable on an irregular fibrous trunk. This project builds that machine at model scale: an adjustable spring-loaded frame with three gripper wheels clamps a coconut trunk model, DC gear motors drive the wheels, slip detection watches for traction loss, and an RF remote commands the climb.

03. Problem Statement

Manual coconut harvesting is hazardous, yet climbing assistance barely exists as a student-buildable project. The project addresses this with a model-scale climbing robot demonstrating the real engineering — traction sizing, motor torque calculation, compliant gripping and wireless control — on a realistic trunk model, with honest documentation of the gap to a full-size palm climber.

04. Objectives

- Build a spring-loaded grip frame that clamps trunks of 20–35 cm diameter.
- Drive climbing with rubber gripper wheels on DC gear motors, torque-sized by calculation.
- Control climb, descend, stop and speed from an RF remote.
- Implement slip detection that halts the drive on traction loss.
- Provide a payload bracket for a camera or cutter mock-up.
- Supply a trunk model for demonstration and a safety procedure.
- Deliver the complete student kit: robot, remote, firmware, sizing docs, report, PPT and viva Q&A.;

05. Proposed Methodology

The frame is built from aluminium with three spring-loaded gripper arms whose tension is adjustable for trunk diameter. DC gear motors, selected from a weight-vs-traction torque calculation documented in the report, drive the rubber wheels. An Arduino-class controller runs the climb logic: grip check on power-up, RF remote commands for climb/descend/stop/speed, and a slip check comparing wheel rotation against actual climb progress. The payload bracket accepts a camera or cutter mock-up to demonstrate the harvesting-assistance use case on the supplied trunk model.

06. System Architecture / Working

The frame is placed around the trunk model and the gripper arms tensioned so all three rubber wheels press firmly against the bark; a grip check confirms the robot holds its own weight. The RF remote's climb command drives the gear motors and the wheels roll the frame up the trunk, with spring compliance holding pressure constant as diameter varies. Firmware watches for slip — wheels turning without climbing — and stops the drive if it occurs. Descend reverses the motors at controlled speed; the stop command brakes the wheels and parks the robot on the trunk.

07. Hardware / Software Requirements

- DC gear motors with rubber gripper wheels
- Spring-loaded aluminium grip frame
- RF remote control link (approx. 30 m)
- Arduino-class motor controller
- H-bridge motor driver
- Li-ion battery pack
- Coconut trunk model section
- Slip-detection firmware
- Motor sizing calculation document

08. Expected Outcomes

- A climbing robot that ascends and descends the trunk model under remote control.
- A documented motor torque and traction sizing calculation.
- Slip detection and remote-stop safety behavior demonstrated.
- A payload-bracket demo of the harvesting-assistance concept.
- A complete report, PPT and viva Q&A; on traction, torque sizing and compliance.

09. Applications

- Demonstrating agricultural-assist robotics for tree crops.
- Teaching traction design and motor sizing from first principles.
- Classroom demos of compliant mechanisms and wireless control.

10. Future Scope

- Full-size palm climber with scaled torque and weatherproofing.
- Automated cutting head on the payload bracket.
- Vision-guided positioning at the crown.
- Multi-tree fleet coordination concepts.