

Fabrication of Coconut Tree Climber

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Abstract: The main aim of this project is to design and fabrication of coconut tree climbing machine. The device consists of an L-shape base frame which supports all the components to be built upon. It is fitted with petrol engine, nylon tyres with rubber grippers at parallel each other for ease of the operations. Power from the petrol engine is supplied to the wheel climbing a coconut tree. Tapered wheel which is attached to the frame gives self-locking to the machine and it will help in balancing the machine while climbing tree. To accommodate for a change in the diameter of coconut tree as the device moves up and down, enough clearance is maintained between two parallel wheels. The device has been tested for its performance and to make it safe, reliable, efficient and also reduces the problems in climbing and cutting coconut from coconut tree to a good extend.

Keywords: Coconut, Harvesting and Tree climbing.

I. INTRODUCTION

The coconut tree (*Cocos nucifera*) is a member of the palm tree family (Arecaceae) and the only living species of the genus *Cocos*. The term "coconut" (or the archaic "cocoanut") can refer to the whole coconut palm, the seed, or the fruit, which botanically is a drupe, not a nut. The name comes from the old Portuguese word *coco*, meaning "head" or "skull", after the three indentations on the coconut shell that resemble facial features. They are ubiquitous in coastal tropical regions and are a cultural icon of the tropics.

Coconut is very popular and common fruits in Southern part of India. At present coconuts are grown in an area of about 43000 ha with a production of 14,695,000 tons. The southern part of the country contributes about 80% of total production. Unfortunately, despite its mass distribution and wide spread around the world, coconut harvesting is still done without proper safety measures which can lead to serious injuries. It is very difficult to climb on coconut tree manually due to the constant cylindrical structure and single stem. If a person wants to climb a coconut tree manually climbing person has to put his hands close to each other on the back of the trunk, and pull one foot in front of the other one in front of the climbing person on the tree. By keeping pressure on the trunk with the balls of the climbing person's feet and toes, walk up alternating moving feet and hands. Technically it seems to be the easiest to learn but requires good balance and arm strength (Jeff Jepson, 2000). People who employed for coconut tree climbing suffer musculoskeletal disorders. It is very hard to learn the necessary skills to climb coconut trees. A professional climber with proper training only could able to climb coconut tree. In Southern part of India traditional method of coconut harvesting is climbing on a tree which is very risky.

There is a need to invent a device to address efficiency safety and cost effective. The design of the device has to be simple enough for villagers to operate, yet work efficiently to appeal to the majority. In present days the climbing methods that are been used by the farmer are Rope climbing method and Rectangle wood seat climbing method. Rope climber is economical and simple in design which consists of rope of length one meter twisted to the shape of the sandal, the user wears this sandal and climb the tree manually. In rectangle wooden seat climber, the user hangs the wooden seat on his back and climbs the tree manually, once he reaches the tree top, he ties the wooden seat to the tree and rest on the seat to harvest the coconut. Although these two methods are simple and economical. It is not safe and cause physical strain to the user.

II. LITERATURE SURVEY

N Jahan et al. [1], presented a paper whose primary goal of the study is to develop a coconut tree climbing device and disseminate it through the farmers. The main goals of the developed machine is to design and fabricate of coconut tree climber. This project is conducted to evaluate the performance of coconut tree

climber and to ensure the operator safety.

Bijo Sebastian [2], presented a completely autonomous system should be capable of approaching a tree, clamping on to it and then begin climbing without any manual intervention. This calls for designing a system that can traverse on multiple terrains including tree trunk, pipelines or poles and also on ground. It should be capable of adjusting its design configuration in order to accommodate variations in the diameter of the cylindrical structure.

Alice Peter et al. [3], the project presented here, focuses on designing a tree climbing robot. Our prime consideration in designing tree climbing robot is of the motion planning and method of gripping. With arms involving four legs and sharp end as feet. The mechanical structure is designed to move the structure upwards against the gravitational forces in successive upper body and lower body movements similar to a tree climber. The gripping is designed in a way to dig the upper or lower part of the structure in to the tree facilitating the upward movement. The results shows that the it can successfully climb the trees. Tree climbing robot has the potential to be applied to various pursuits, such as harvesting, tree maintenance, and observation of tree dwelling animal.

Arjun Prasad et al. [4], gave a prototype design of a wireless robot which provides a better solution for harvesting purpose in palm trees. In this system a robot with wheeled leg mechanism is used. Conventionally, harvesting has always been done manually and any device developed also requires a human labour to accompany it. Safety of the worker and the increased labour charges are the primary concerns of the farm owners now. In this design, Electric motors are used to control the movement of the robot.

Fasil TK et al. [5], have fabricated a machine working on the basic principle of rope pulley system. The shaft of the motor is welded to the drum which winds the steel rope around the tree. During the drum winding the spring gets contracted and the spring force acts opposite to the direction of the applied force. This opposite force generates an upward motion. The climbing down mechanism is by a rope which is tied on to lower and upper rings. When the rope is pulled from the ground the mechanism comes down in a step wise manner with the help of the rings.

III. OBJETIVES AND METHODOLOGY

3.1 Objectives

The main objective of this proposed work are as follows:

- To design and develop portable coconut cutting machine.
- To design the RF transmitter and receiver circuit to control the machine.
- To install properly designed slicer arm so many numbers of trees can be harvested in a single climb thus increasing the efficiency.
- To design a simple, safe and reliable machine. So that an unskilled farmer and labor can also operate the machine safely and efficiently.

3.2 Methodology

- At first mild steel frame is made with given dimension, after those bearings are fixed to the frame.
- Wheels and shafts are attached to the frame with the help of bearings. After transmission system is assembled in the frame two stroke petrol engine is assembled to the transmission system.
- Supporting wheel which is attached to the air springs are attached to the frame by welding process. Slicer arm is fixed to the frame with the help of bolts and nuts. And slicer arm is fabricated by mild steel rods by welding process.
- Wireless remote consists transmitter and receiver, transmitter has two joystick module and one push button to control and operate machine

IV. WORKING PRINCIPLE

The coconut tree climbing machine works on the basic principle of friction that is the relative lateral motion of two solid surfaces in contact. The machine developed consists of a base frame with two nylon wheels of diameter 250 mm and distance between two wheels is 600 mm. wheels are arranged in such a way that to give enough locking between machine and coconut tree. Wheels are connected to the main frame through bearings which are driven by high torque geared diesel engine. The frame consists of a slot to fix the slicer arm. The remote is designed to operate the harvesting machine. By using this remote operator can control the machine by pressing the buttons on the remote.

All the main parts are being supported by the frame and machine is operated with wireless remote controller. The machine is fixed to a coconut tree. Depending on the work either slicer arm or sprayer arm is

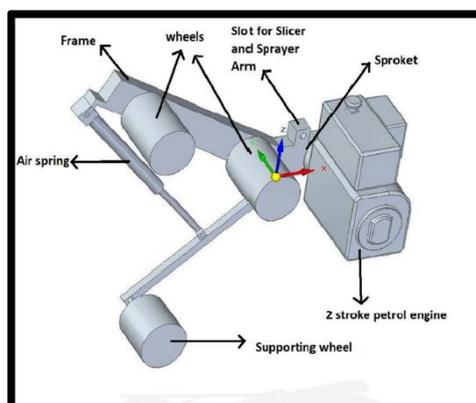
going to fix to the frame. When operator press the start button on the remote engine is going to start, and when he presses the forward button, the machine will start to climb a coconut tree. After removing a coconut bunch by operating the remote machine can be bring down.

4.1 Components

The project work required better frame for better support and stability. The frame material was initially collected and fabricated depending on the size required. The overall fabrication of the project model was done starting from frame to end project. The various steps involved in the fabrication of the project are measurement, marking, cutting, welding, grinding, cleaning, painting, testing and implementation. The components used in design and fabrication of electromagnetic embossing machine are as follows;

- Frame
- Shaft
- Bearing
- Petrolengine
- Chain
- Sprocket
- Wheels
- Slicerarm
- RFtransmitterandreceiver module
- Battery
- PushButton
- Wires

V. FIGURES



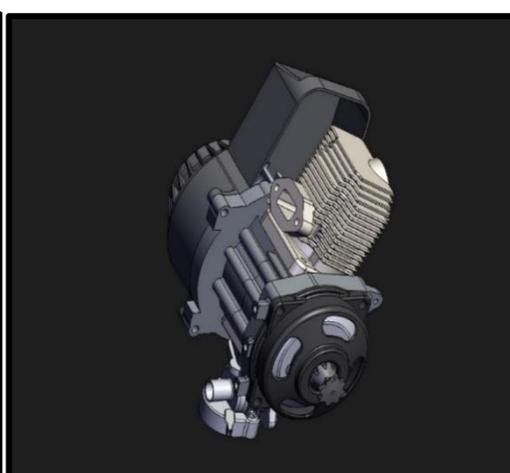
CAED Model of Project



CAED Model of Frame



Side View



Front View

CAED Model of Engine

VI. CONCLUSION

Our main aim is to represent our innovative concept, we have taken some useful data from our model. The observations which were made are:

- At the present condition, the machine can be used to cut the coconut from the coconut tree.
- And the machine can also be used for spraying operation. For this purpose, a special attachment will replace the cutter.

To overcome problems in conventional machines such as low efficiency, difficult to operate, the proposed model of coconut plucking machine is helpful and complete all the expectations needed in plucking the coconut. Based on the project done and the further discussions, the conclusions are:

- The machine will overcome the limitations of existing machines by introducing the simplest mechanism.
- Compact and simple in geometry.
- Cost effective in small, medium and large industries.
- Works on minimizing effort on the tree which in turn will not damage the tree. The safety and health of humans can be ensured by this machine.

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