

DESIGN AND DEVELOPMENT OF COCONUT TREE CLIMBING ROBOT

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ABSTRACT—Coconuts harvested every year, play a huge role in the economy of several regions and countries. In India, main places are the states of Tamil Nadu, Lakshadweep, Kerala, and Karnataka. Majority of coconuts harvesting is done by climbing the tree and cutting it by hand. It is seem simple; but, it is actually dangerous. The need to develop a device for coconut tree climbing and cutting. We have studied various research papers to do the work in this area. The large scope of development in this topic because of the cost and complexity design device available in the market. The major objective of this study is to design a device for coconut tree climbing and cutting containing fewer complexities and which is comparatively less costly.
Keywords— harvested, cutting, climbing.

I. INTRODUCTION

The Coconut are grown in more than 80 countries of the world, with a production of 61 million tones per year. It is exported by the tones around the world, bringing in revenue to various countries. However, they also have important use. The India produces near to 25% of the world's coconut meat and fiber, which is made into oil, shampoo, rope, and door mats. Kerala produces half of India's harvest. The majority of coconuts are cut by climbing the tree and cutting the nuts by hand. This process seem simple; however, it is actually dangerous. In response, there is a genuine need to develop a device. The study is to design a coconut tree climbing robot and cutting coconuts for farmers. It is very difficult to climb on coconut tree manually due to non constant cylindrical structure. The Professional climber could able to climb a coconut tree. There are no 100% safe coconuts cutting device currently in the market. This device will be easily use for the people who are having large coconut cultivation. The climbers, our group will device a coconut tree climbing and cutting robot that meets the following goals: It has controlled from the ground. All can able to operate the robot. The cutting method becomes as fast. It can

successfully climb a coconut tree of variable diameters and height is made.

II. PROBLEM STATEMENT

The India contributes 23% of the world's total coconut production, and is the second largest producer in the world. 92% of India's total production is from south Indian states in South India. The recent times there is shortage of coconut tree climbers, which have adversely affected the cutting of coconuts throughout the country. It is mainly due to the risk factor involved in climbing of coconut trees. Many accidents, some of which have even resulted in deaths. The main parts of the system would be the arm which is used for cutting coconuts. The focus of this research work is on constructing a controlled robotic arm dedicated to the coconut cutting system to be used in a coconut tree climbing. The coconuts are spread at the top of the coconut trees and its stacks are very hard; therefore heavy-duty cutting machinery is required. Furthermore, the robotic arm must have sufficient degrees of freedom to reach the desired area of the coconut palm and should be able to cut down coconuts without affecting the stability of the coconut harvesting system. The whole system should be user-friendly and cost-effective.

III. LITERATURE REVIEW

"Development of An Autonomous Tree Climbing Robot" is the project works which consist of developing an "autonomous tree climbing and pesticide spraying robot" is done by Eldho Jacob [1]. The robot is made for analyse and climb on the tree autonomously. Tree climbing Robot, is inspired from human pole climbers and relies on wheel mechanism to ensure smooth and fast climbing motion. The robot has modelled and designed using 3-D design software. Electronic compartment was developed to the accommodate the electronic parts on board. Calculation of power required to, upward force, and torque are done. This robot has been only single layer hexagonal structure hence it is not dynamically stable [1]

The various models for tree climbing and plucking were designed by Rajesh Kannan. It taken into the account the safety, reliability, the ease of use which is capable for climbing trees, cutting down coconuts, cleaning the trees top sand spraying pesticides. This system is designed that it can be controlled by any human . A prototype of the arm has been designed and tested successfully by using Microsoft Kinect. designed prototype responds to the human gestures with negligible gap in the respond time and hence can be implemented in a real time. This model is not more reliable for inclined trees and tall coconut trees. It has been heavy structure and mounting is difficult [2] Autonomous Tree Climbing Robot Utilizing the Four Bar Linkage System designed by B.C. Widanagamage the work was presented in this paper, it taken into focuses on the designing Tree Robot .The mechanical structure is designed to the move the structure upwards against the gravitational forces in the successive upper body and lower body movements similar to a tree climber [3] In this research paper we get knowledge about prime consideration in the designing tree climbing robot is of the motion planning and method of gripping. The arms are involving four legs and sharp end as feet. Tree climbing robot has the potential to be the applied to various pursuits, such as harvesting, tree maintenance, and observation of tree dwelling animals [4] "Development of Automated Coconut Harvester Prototype", Designed by **Senthilkumar S K** in this paper focuses on the designing an automated tree climbing robot, Tree robot which doesn't require human labour to the accompany the device but only to control it from the ground using a remote control [5]

IV. OBJECTIVE

1. Built a coconut climbing robot.
2. Attachment of 3 degree of freedom robotic arm cutting coconut.
3. Also fertilizer spraying nozzle attachment powered by high pressure 5 bar +ve displacement pump.
4. To build a Tree climbing machine which can bear a loading up to 2 kilograms.

V. ADVANTAGES

1. Initial cost will be less.
2. Free from wear adjustment.
3. Less power consumption
4. Less skill technicians is sufficient to operate
5. It gives simplified very operation. Installation is simplified very much

VI. APPLICATIONS

For automobile application Industrial application Agricultural Application Tree climber The lot of work is done in this area but there is no device which is 100% accurate. The various designs which are giving positive results but lot of complexities Design. We have designed one model of coconut tree climber and cutting. The robot will have a simple Design reduce complexity of control compared to the existing tree climbing robots.

VII. METHODOLOGY

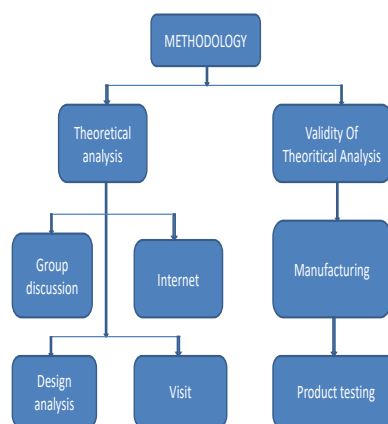


Fig 1: Flowchart

a) Construction

Unit powered by battery 12volt 8 amp. Self locking worm gear box 12volt powered are used in our robot. For degree of freedom 5 rpm DC motors are utilized. For cutting High speed DC Motor is used. Also four helical spring are utilized for self tensioning

b) Working

Motors used for robot can rotate in both direction clockwise & Anticlockwise. Wisely robot can move upward & downward. We have used robotic arm to locate the cutter position

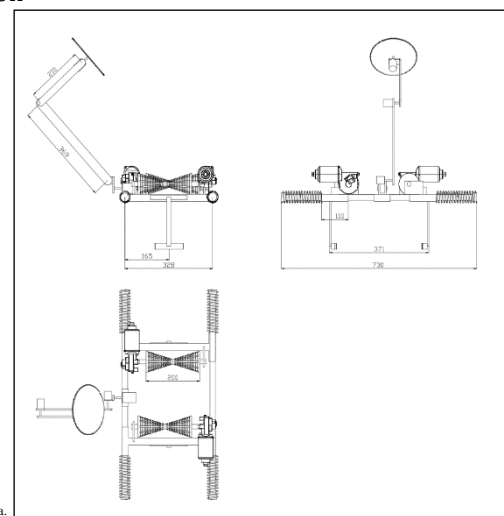


Fig. 2 D view

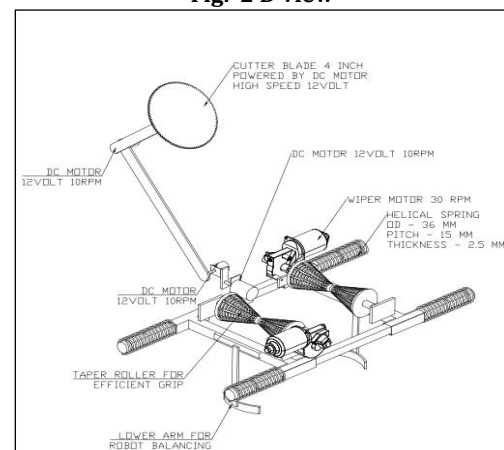


Fig.3. 3D view

VIII. CONCLUSION

The lot of work is done in this area but there is no device which is 100% accurate. The various designs which are giving positive results but lot of complexities Design.

We have designed one model of coconut tree climber and cutting. The robot will have a simple Design reduce complexity of control compared to the existing tree climbing robots. The hexagonal shape of robot so that it can easily adjust. The system also aims to make easy and simple Design model which can be used even by labor.

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X. REFERENCES

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