



Mobile Operated Coconut Harvesting Machine

Cousalya C¹, Deepalakshmi C², Keerthika V³, Malini M⁴, P. Arthiya⁵

UG Student, Paavai Engineering College, Namakkal, Tamil Nadu, India^{1,2,3,4}

Assistant Professor, Paavai Engineering College, Namakkal, Tamil Nadu, India⁵

ABSTRACT: With over five billion coconuts harvested every year, coconuts play a huge role in the economy of several regions and countries. In India prominent places of harvested are the states of Tamil Nadu, Kerala and Karnataka. The majority of coconuts are harvested by climbing the tree and cutting the nuts by hand. This process may seem simple; however, it is actually quite dangerous. There are different approaches available for the climbing of coconut trees, however, they require people to accompany the mechanical structure. The idea of a mobile controlled tree climbing mechanism is proposed to make the climbing process easier and convenient. In this, the mobile app called BLUE TERM APP is used for the operating the device. This app is connected to the wireless device of Bluetooth Module which is used for the purpose of receiving and transmitting the signal i.e., signal receiving from the app and transmitting to the microcontroller. Micro controller is a programming device which programs the entire mechanism with the help of arduino board, timer module, and is displayed in the LCD display. The mechanical frame holding all the devices inside it and by adjusting the driver circuit which is powered by solar panel through battery, the complete structure can be driven up and down. The battery can store this energy and reuse it. Grip wheels are used to produce friction for the purpose of holding the tree and climbing which is driven by the Gear motors. There are three DC Gear motors in which, the two motor is used for the purpose of movement and climbing purpose and the rest is used for robotic arm movement. The Robotic arm is placed on the mechanical frame to pick the coconut from the tree. The aim of the project is to discuss about the features of such a robotic coconut tree climber with an arm to cut the coconuts and also cut other fruits.

KEYWORDS: Coconut climber, Blue term app, Bluetooth module, motors, solar panel, battery, microcontroller, Robotic arm.

I. INTRODUCTION

It's very hard to learn the necessary skills to climb coconut trees. The few first times, peoples barely managed to get a few feet off the ground. In addition to fear, the soft skin on the palms of hands and soles of feet made climbing difficult. During the initial climbing the skin of palm, chest and foot skin may be disturbed. This is what happens when people slide down hugging a coconut tree as hard as they can. There are two basic techniques and they are easy to learn. After that the user just need to practice and to forget about soft skin. It will probably get cut a bit the first time on the tree, but after continuous practice it will be fine. After a week, climbing the trees becomes second nature and the collection of coconuts is one of the easier and more enjoyable survival skills the user will learn. All techniques should be done barefoot and barehanded. Due to the height and lack of branches, it is very difficult to climb on coconut trees. A professional climber with proper training only could able to climb coconut tree. Due to the risk involved nowadays very less people are coming forward to climb on coconut trees. Due to the lack of professional climbers, the existing professionals may charge more from the owners, moreover as the educational background of Indian youth is increasing most of the people may hesitate to come in this type of profession.

Considering this scenario, a device which will help the user to climb coconut tree easily will be useful for the people who is having large coconut cultivation as well as residents who is having less coconut trees. This kind of devices will encourage more people to come forward to agricultural sector. The concept behind this paper is to improve efficiency of cutting of coconut with less efforts and less man power and to increase the rate of cutting the coconuts. This project reduces the chance of any hazard while cutting the coconut along with this. This machine is the portable device, due to its less weight it can be easily portable. The life of this machine is very long. Only the changing of cutting blades and drill tool have to be required after a certain cutting coconut frequently. Other than this the screw jack has an long life. It required less maintenances as compare to other cutting process of coconuts. There is only need of checking the sharpness of blades. This project will provide the proper solution of climbing the tree using mobile operated coconut harvesting machine.



II.LITERATURE REVIEW

B.C. Widanagamage, T.N. Gallege, S. Salgado, J. Wijayakulasooriya presented - "TREEBOT: AN AUTONOMOUS TREE CLIMBING ROBOT UTILIZING FOUR BAR LINKAGE SYSTEM"(2014) presented in this paper, focuses on designing Tree Robot: a tree climbing robot. Our prime consideration in designing tree robot is of the mechanical structure and method of gripping. With arms involving a four bar linkage system and screw mechanism. 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 hold the upper or lower part of the structure to the tree facilitating the upward movement. The scope of this project is limited to climb coconut trees having diameters only between 15 cm and 25 cm.

Relevance to current Research

Balachandar, K.Chaithanya, S.Balamurugan, Ch.Vijaykumar - "DESIGN AND FABRICATION OF TENDER COCONUT CUTTING MACHINE"(2015) explained that Automation plays a vital role in major things in day to day life. It is not only applicable in automotive industries. The necessary of automation is to reduce the human effort and to save time. Here the tender coconut opening in easiest way is proposed. But most of the people cut the coconuts manually. But it is more difficult and skilled persons required. A common problem that many people are facing is punching and splitting the coconut. The existing (traditional) tools used are unsafe, messy and also needs skill and training. The risk of injury is also too high. There are some machines for pairing coconut, but until now no tool exists to punch a hole and split it open. This necessitates the development of a cutting and punching coconut. The selected concept mainly consists of punch operated by a lever and torsion spring mechanism. When the coconut has to be punched the operator places the coconut on the top of the machine in natural rest position and the lever is raised and pressed against the tender coconut to punch a hole. For cutting, the coconut is placed in the rest position and the lever is raised & operated to cut the coconut to extract the cut.

Relevance to current Research

H. Rajanikanth, Prof. Reddy Naik. J - "PRODUCT DESIGN AND DEVELOPMENT OF TENDER COCONUT PUNCHING AND SPLITTING MACHINE"(2015) explained the project is mainly design to cut and the development of a punch-cum-splitter for punching and splitting the tender coconut. The present work focuses on the development of a manually operated coconut punch-cum-splitter for extracting coconut water and coconut meat. In this direction, customer needs statement was translated to the concept; by concept generation. The best concept was selected using pugh matrix and concept scoring matrix. The selected concept mainly consists of punch operated by a lever and torsion spring mechanism. When the tender coconut has to be punched, the operator places the tender coconut on the top of the holding mechanism in natural rest position and the lever is raised and pressed against the tender coconut to punch a hole. For splitting, the tender coconut is placed in the rest position and the lever is raised & operated to split the tender coconut to extract the meat.

Relevance to current Research

Akshay Prasad Dubey, Santosh Mohan pattnaik, Arunava Banerjee, Rajasreesarkar -"AUTONOMOUS CONTROL AND IMPLEMENTATION OF COCONUT TREE CLIMBING AND HARVESTING" (2016) paper focuses on designing a low cost coconut tree climbing and harvesting robot. The kinematics and the motion of the robot are designed by referring to the motion of coconut harvester. The robot consists of two segments joined by a pair of threaded rods coupled to motors. The mechanical frame is designed in draft sight software and is implemented using aluminum segments and threaded rods. A locomotion algorithm is developed to provide the robot with an autonomous capability for climbing. The prototype of the robot is implemented and tested successfully.

Relevance to current Research

Rajesh KannanMegalingam, Sakthiprasad K M, Sreekanth M M, GedelaVamsyVivek - A SURVEY ON ROBOTIC COCONUT TREE CLIMBERS-EXISTING METHODS AND TECHNIQUES (2017) study paper, it analyse the present details of various existing mechanical models available in the market and have not yet solved this issue. Along with this, it discuss how robotics and automation could be a possible solution for this entire problem. In this context, it is about the



features of such robotic system and also give suggestions on various unmanned robotic models that can be designed and implemented.

III. METHODOLOGY OF PROPOSED SURVEY

Coconut tree climber is a machine by which climbing on coconut tree is possible without much human efforts. Now a days most of the human activities are either replaced by the use of machines or kind of equipments. Robotics and Automation is also a possible solution. In this project, the mobile controlled coconut harvesting machine climbs the tree and harvest the coconut while the human operated on the ground by use of mobile phones. Instead of the device is full of automation, it is only powered by solar energy. So it does not required any fuel cost and is easily chargeable. The energy source taken from the solar energy which is regulated by the charge controller which manages the power going into the battery bank from the solar array.

The energy supplied to the battery of 12V which is stored and supplied to entire system. After that, the rectifier is connected to the battery which is a device that converts AC to DC and supplies only sufficient quantity of voltage. Then the Bluetooth module is connected which is communicating the information between the mobile (i.e Blue Term app) and the micro controller. The microcontroller is a programming device which program on the arduino board for timer module, resistor, capacitor, LED, dropout voltage, current limiting, voltage adjustment, amplifier. Then the information passed to the Relay board which is the real-time control that is operated by the electromagnet when the relay is de-energized, the sets of contacts were closed. Finally, the instruction given by the operator from the mobile which is passes to the motors and the device runs and the wheels moves FORWARD or BACKWARD or UP and DOWN. And also, the arm harvest the coconut and also other fruits. The aim of the project is to design the portable automatic coconut cutter which is controlled by mobile can climbing the coconut tree and harvesting the coconut.

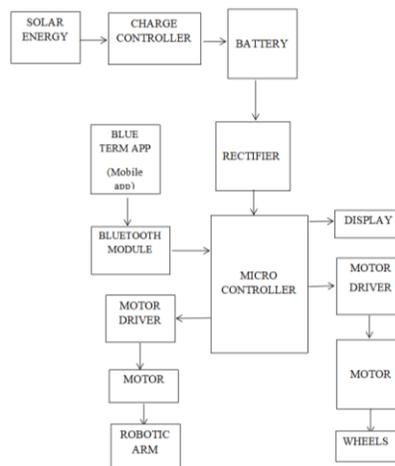


Figure.1 Block Diagram

The solar energy is collected from the solar panel of 12V is supplied to the battery by the charge controller which manages the power going into the battery bank from the solar array. The energy supplied to the battery of 12V which is stored and supplied to entire system. After that, the rectifier is connected to the battery for the purpose of which converts AC to DC and supplies only sufficient quantity of voltage. Then the Bluetooth module is a device which performs two functions such as receiving and transmitting the signal. It is connected between the mobile (i.e Blue Term app) and the micro controller which is communicating the information. The microcontroller is a programming device which program on the arduino board for timer module, resistor, capacitor, LED, dropout voltage, current limiting, voltage adjustment, amplifier. Then the

information passed to the Relay board which is the real-time control that is operated by the electromagnet when the relay is de-energized, the sets of contacts were closed. The Relay board controls the signal from mobile so it is known as motor driver. Finally, according to the information, the motors runs and climbs the tree and harvesting the coconut. And also, there is a blade which is used for cut the fruits so it also used for cutting other kind of fruits.

IV. CONCLUSION AND FUTURE WORK

Therefore, the mobile controlled coconut harvester is fabricated and the machine successfully climb the tree and the coconuts can be harvested. And also the husk can be removed by the cutting tools and blades. It can be use for the large scale and small scale farmers.

This machine is mainly design to harvest the coconut and to cut coconut with the help of various tools like cutting blade, hole making tool. The important thing about this machine is that it reduces the time of cutting the coconut, along with the coconut the various fruits can be cut out on these machines. The two operations can be done simultaneously there is no any extra attachment is required for performing the operations. The cost of the developed machine is very less so that it can be used in small restaurants and shops. This will definitely improve the productivity of coconut in all parts of the country and various new applications can be generated in future.



Figure.1 Final Output

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