# Plan, Advancement of Robotized Coconut-Scratching Machine

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## Abstract

From one side of the planet to the other, coconuts are eaten up by hungry individuals. As well as being nutritious and valuable, they have numerous different applications. Coconuts are multipurpose and might be utilized for different purposes, including yet not restricted to: fuel, skin wellbeing, malignant growth anticipation, beauty care products, and cooking. It requires a great deal of investment and work to scratch coconut. The administrator should turn the coconut while applying strain to scratch off the tissue, since this activity is done physically. There are popularized coconut scratching machines available, but they actually need some human mediation and are not completely robotized. The self-loader strategy frequently utilizes an electric engine to turn an edge while the client presses the coconut half-shell against it. The administrator faces unmistakable risks in every ways. To conquer the notable challenges related with grinding coconuts, this study subtleties the improvement of a mechanized scratching machine. This paper proposes a plan that disposes of practically all dangers related with coconut scrubbers. The administrator is saved both work and risk thanks to the machine's finished computerization. Coordinated inside the framework is a bi-directionally-movable sharp edge. The capacity to move in three aspects is created conceivable by a bracing system that can move in three bearings. It doesn't require over fifteen seconds to clip the coconut half shell. Once mounted, scratching the coconut is completely computerized at the hint of a beginning button. The critical commitment of this study is the creation and configuration subtleties of the working model.

**Keywords: Coconuts, Automated Scraping, Human Intervention, Blade.**

## Introduction

Coconuts are consumed all around the globe as a popular fruit. They have several applications, including some that are beneficial to one's health and nutrition. Coconut may be used in a variety of ways, including cuisine and nutrition.

• Prevention of cancer and overall skin health

• Cosmetics and make-up

• Fuel (Charcoal) (fuel) The coconuts are broken apart with a hammer or a knife in the process of coconut processing that is done on a smaller scale. Both hand tools and mounted-type coconut scrapers are used in the process of extracting the kernel. According to Practical Action (2008), even in the case of coconut processing on a small scale, the use of hand instruments is very laborious and requires a lot of patience. Coconut scraper machines that are controlled manually are very portable and can be used efficiently in families. The clamping screw is used to attach the whole mechanism on a table, which allows the machine to be used effectively. The scraping bit receives the rotation that is transmitted from the manual handle during the process of rotation (Figure 1a). The half-shell of the dehusked coconut is forced against the sharp bit while the spinning mechanism is in motion. In order to grate a coconut with this gadget, a considerable amount of work is required. A slide might result in significant injuries, thus the operator has to pay attention to the situation because of this possibility.

It is estimated that India is the third largest producer of coconuts in the whole world. According to the study that was conducted in 2017, the production rate was around 11.47 million metric tonnes. There are numerous techniques that are used to remove the coconut husk, and this article demonstrates that one of those methods is to rub and crush the coconut in order to get coconut milk and other edible portions. However, these methods have a number of issues and restrictions when it comes to operating the machines. There is a correlation between these problems and the pace of production of virgin coconut oil. The customer is exposed to an even greater level of risk by these techniques. It is advised that the automated and less destructive strategy be used in order to have a better degree of success in removing the present constraints. Because of this, there is no longer a need for professional operators to be engaged in the process of preparing virgin coconut oil. During the course of

our research, we discovered that the diameters of coconuts vary from one another regarding the environment in which they are grown. The design of the machine is determined by the particular location and the size. The quantity of virgin coconut oil that is produced as a result of the procedure is determined by a great number of different elements. Continuous monitoring of the variables is performed in order to attain high production. As far as marketing this equipment is concerned, there is a significant potential in our region. Initially and most importantly, the creation of the project was motivated by the fact that there is a shortage of competent agricultural labourers.

Even though there are distinct machines for each of these operations, we were able to merge them into a single automated machine. In this day and age, we believed that it would be of tremendous importance to be able to offer a product of high quality within a short period of time while maintaining a high rate of production. The whole process of obtaining the oil is carried out by a single piece of machinery. It is possible to eliminate the labour issue with it, regardless of the environment or the circumstances of the product. This procedure also ensures that the workers' safety is not compromised.

The scraper, which is often referred to as a grater, is a culinary instrument that is typically constructed from metal (and occasionally ceramic or even wood), and it is designed to shred food by having sharp protrusions or holes as its primary function. Grators are available in a wide range of sizes, from those with bigger holes, which are often used for the purpose of shredding cheese and vegetables, to those with extremely fine graters and micro planes, which are utilised for the purpose of zesting citrus fruits. Over the course of many decades, there has been no alteration to the method by which coconut is grated. With the only exception of the motorised blade, there has been no other modification. However, it is necessary to firmly grasp the coconut. On the other hand, all of that is about to change as a result of the development of a cutting-edge coconut grater that can do the task in a matter of minutes while also providing enhanced safety and convenience. For the most part, this machine is really helpful and adaptable, and it has the potential to be profitable. Utilising fresh coconuts, the coconut scraper creates coconut that is both fresh and moist.

## Problem Definition

The process that led to the conception of the coconut scraping machine that is described in this article can be summed up as a five-step procedure: the problem definition and research objective; the literature review; the development of the scraper mechanism; the development of the clamp mechanism; the description of the electrical and control systems; and the detailed design. In order to have a head start on the design process, the issue and the purpose have been outlined in the first two parts of the article. In order to develop an understanding of the structure of the coconut, a literature study was carried out. An examination of the existing ideas of coconut machines has been carried out in order to discover characteristics that may be included into the model that has been presented. The scraper mechanism was designed to allow for movement along at least two axes, and it was created from the ground up. The material was chosen based on the designs that were already in existence as well as the requirements for the coconut kernel supply. The mechanism of the clamp was designed to guarantee that the coconut is held securely in position and that the amount of time required to mount the coconut is kept to a minimum. The operation of the primary subsystems of the model that was suggested in this study served as the basis for the quick review of the electrical and control circuits.

The choosing of the design: At the end of the brainstorming session, a member of the team evaluates the various research papers and the technical research that has been conducted in the market. This evaluation is based on the findings of the market research. During the brainstorming session, the members of the team came up with a consensus on a number of different designs, which were then approved.

Calculations and design validation are included in B. The designing step is a highly essential phase since all technical elements, including strength, fatigue, and factor of safety, was taken into consideration all during the process of completing calculations, and the design was confirmed using solid works software.

The third step is prototyping and analysis. Once the calculations have been finished, a prototype may be created for the purpose of monitoring the real circumstances. This provides a glimpse of the actual design and its strength, which in turn provides the opportunity to conduct testing of any sort that is conceivable.

**OBJECTIVES**

The creation of an automated coconut scraping machine is the subject of this study, which aims to detail its evolution here. There are a variety of sizes and forms available for coconuts. To be able to automate the design, it would be necessary to greatly minimise the amount of human input that is required during operation. In addition to this, the new design has to be able to accept coconuts of varying sizes and shapes simultaneously.

It is necessary for the new scraping machine to be developed in such a manner that it is capable of self-adjusting, taking into account the magnitude and contour of the coconut. The sharp bit of typical coconut scrapers rotates at a higher rotation rate than other types of scrapers.

The operator is holding the coconut shell that has been dehusked and pressing the interior of the shell, which contains the flesh, against the piece of sharp machinery that is revolving.

This procedure is not only time-consuming but also presents a number of potential safety risks. It is thus vital to design a system that is capable of imitating the operator when they are scraping coconuts. As far as the authors are aware, there are no studies that provide a description of the process of developing a scraping machine that is completely automated. The commercial coconut scraping machines that are now available are not entirely automated and still need the operator to be physically present in order to function properly.

1. The primary purpose of the machine is to lessen the amount of labour that is required by humans in order to extract coconut smash.
2. Another purpose is to minimise the amount of tiredness experienced by human beings who run the machine, as well as to lessen the amount of vibration that occurs when the machine is in operation.
3. An additional goal is to enhance the effectiveness of the machine by extracting a greater quantity of coconut out of the same amount of input (potential energy).
4. In addition, to enhance the design by taking into account the ergonomics of the human experience.

## Description of the Proposed Work

Particulars and prerequisites are outlined. A summary of the needs and specifications that were taken into consideration during the design of the scraper machine is provided in the following section:

- The machine must be able to come with you. It has been calculated that the dimensions are 1.045 metres by 0.46 metres by 0.143 metres.
- The system must be completely automated.
- The amount of effort that is required to grate the coconuts must be significantly reduced.
- There must be very few to no contacts with moving parts.
- The machine must be completely automatic after the half-shell coconut is placed in the clamp.
- The machine must be able to run at a relatively high speed.
- The machine must be resistant to damage.

## Methodologies

It is possible to manually grate two pieces of coconut using the arrangement of the grating tool, which may be customised to meet the requirements of the kind of product that the customer requires. The grating tool is attached to the shaft, which is powered by the motor at the same time as it is directly tied to the gearbox by a chain drive that does not allow for reduction. For the purpose of eliminating a greater quantity of material in a single pass, the hemispherical grating tool is chosen over the other kinds of tools. The dimensions of the tool are chosen in such a manner that makes it feasible to grate the majority of the coconut. Grate the coconut using a tool with a smaller diameter, which will need you to rotate the tool around the inner perimeter of the coconut, which is a laborious operation. This is one of the

disadvantages of using a tool with a smaller diameter. There will be serrated teeth on the flaps of the tool, and these teeth will be the ones that will actually come into touch with the section of the coconut that has to be grated. To the greatest extent possible, it will remove the edible portion of the shell from the fruit. Instead of using a single blade, we have included four blades into this machine. These blades are designed to operate simultaneously, allowing for the scraping of four pieces of coconuts at the same time. The use of manpower, time, and electricity will all decrease as a result of this. Listed below are the various components that are used in the machine that scrapes coconuts.

**DESIGN OF THE MACHINE**

In the process of developing the machine, the size of the coconut that is accessible is the most important thing to take into consideration. According to the findings of the research, the varieties of coconut fruit may be found in a range of sizes. The coconut often comes in the following dimensions: X=190mm, Y=100mm, and Z=100mm. This particular size is the most common.In the dehusker machine, the coconut is brought into contact with the cylinder. According to the literature that is now accessible, the coconut arrives at the cylinder at an angle that falls somewhere between 20 and 30 degrees, and one fifth of the width of the coconut is to be put into the area that exists between the cylinder. The frame is 762 inches tall, 762 inches wide, and 915 inches tall. The width of the dehusking cylinder is thirty millimetres, and the frame is equipped with two rollers that have a diameter of thirty-eight millimetres and an estimated length of six hundred and twenty millimetres. These rollers are supported by ball bearings.Prior to designing the specs, it is necessary to determine the amount of torque that is necessary to dehusk the coconut. The amount of torque that may be created can be determined by multiplying the force that is generated by the perpendicular distance that exists between the rollers' peripheries. 50 millimetres is the perpendicular distance between the perimeter of the rollers. The roller exerts a force equal to 1880 Newtons. 1.25% is the factor of safety. Therefore, the torque is equal to 94 times 1.25, which is 117.5 Nm. P equals half a horsepower, which is the power of the motor. N equals 1440 revolutions per minute, which is the speed of the motor.

## Conclusion

It is possible to scrape in a shorter amount of time than with traditional equipment, and the amount of time and power that is used is much lower. Because the amount of manpower required is so low, this machine is now being used in a number of different regions that produce vast quantities of food. Through the use of a multi-blade system that is driven by a single drive, it is possible to minimise the amount of manpower and time it takes to scrape coconut.

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