Development of peanut separator and thruster

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Abstract. Peanuts have been in existence since the beginning of human life. It has a high carbon content and is rich in oil and protein. Peanut oil extraction is more common in most developing countries. Peanut is a commonly used, edible commodity, and oil is used as a cooking medium. Upon oil extraction, the by-product of the peanut cake often contains 43-65 per cent protein and 6-20 per cent fat, which is usually used as feed for cows and goats. There is currently a shortage of farm workers and an increase in harvesting costs. The factors mentioned above mean that farmers are not interested in growing peanuts. The removal of peanut shells is a time-consuming and costly operation. During harvesting, the temperature is very high, making it impossible for humans to work. Peanut thresher is used to solve these problems by removing peanuts that minimize time and expense. Our project focuses mainly on the design and development of a peanut cutting machine with a 0.5 hp motor. The workers removed the peanut capsules from the harvest at the beginning. The output of this method was very poor and did not meet consumer demand because it was a time-consuming operation. The main part of our project is a rotating drum with nails. They feed the peanuts to the rotating drum. Rotating drum tips isolate the pods from field harvest. There are large peanut harvesters on the market, but small farmers cannot afford these harvesters. Our machine is small, light and inexpensive. Farmers with a small farm may afford to use our machine.

Keywords- Peanuts, harvesting, thruster, pod separator, productivity.

1. Introduction
Peanut or peanuts are a family of legumes or beans. Indian peanuts can be used in a variety of varieties, such Portuguese, and Red Natal. We have a rich taste of nuts, a sweet taste, a crisp texture and a relatively longer shelf life. For some production regions, the soil conditions for Shell are perfect
for dry, clean and flawless peanuts. Peanut is India's most important oilseed crop and plays a key role in bridging the lack of vegetable oil. Figure 1 shows the groundnut below.

![Groundnut](image1)

**Figure 1.** Groundnut

Indian peanuts are made available throughout the year. Knowledge and quality concerns are steadily increasing among Indian peanut vendors and processors. Sorting and sorting multiples will quickly become the norm. The Indian manufacturer can produce and supply edible peanuts that meet the highest standards. In addition to raw edible peanuts, India can supply roasted salted peanuts, white peanuts and dry roasted peanuts as well as a variety of peanut-based products.

1.1. Previous work

1.1.1. Type of combined peeler.

As seen in the example, the peanut extractor comb is used to separate the pods from the wet peanut screws. This was established by the Zonal Research Center of Tamil Nadu Agricultural University in Coimbatore. The unit consists of a square frame with 4 vertical standards, from the extended metal strip, shaped like a comb, and is mounted on each side. The sheath is extracted by drawing a handful of screws onto the comb with little force. The arrangement allows the use of four persons at the same time. Using different approaches, the pods are separated from the vines. The plants are stacked in piles of beam shape, with the end of the pod exposed. In one week’s time, the pods become brittle and the pods pellet by hand. The pods are first lifted off the ground in some parts of India, dried out in the field, and then the ends of the pod are struck against the crossbar to remove the pods. Some of the sleeves are getting hurt. The extraction method is cheaper. There’s a basic comb scraper and a household scraper that can be used for peanut packet styles. Figure 2 shows the comb type stripper.

![Comb type stripper](image2)

**Figure 2.** Comb type stripper

1.1.2 Traditional method.

The threshing cycle varies from old stick and chamfer methods to modern electric threshing machines. In India, small and medium-sized owners thresh and rake manually. Variations are also present when the pods are removed from the plant. After harvesting, the plants are stacked from one pile to another, revealing the end of the pod. After the harvest has been in this state for about a week, the sticks become brittle, and the plants pinch the pods with contractions. This method is quite difficult, as the
pin's connection to the pod is stronger with the beam form, but the drying of the plants for a few days makes it easier to do so. Sometimes, when the storage area is limited and the work is open, the peeling of the pods next to the crop is also done. In this case, the pods are immediately dried after peeling. The standard procedure is to separate the pods by rubbing against a rough stone or a thick iron bar at the end of the seed plant. This method has a minimal effect on the sleeves. Figure 3 shows the photographic view of the conventional process.

Figure 3. Traditional method

2. Literature Review

In article [1] concerns the pedal-peanut decoding system. It is the safest option to use the farmer instead of manual action. The machine works with a pedal to prevent energy consumption that reduces production costs. The machine also saves time and energy. In a very short time, we will achieve higher efficiency if we continue to operate continuously. This device is very simple to use, and no extra work is required to run a computer. The electrical peanut machine has been designed and manufactured. Machine operation is the control of the roller spinning motor [2]. In the crushing chamber, the ground nuts are fed to the hopper and compressed between the semi-circular mesh and the roller. The ground walnuts are separated from the shell. In article [3] has produced a peanut peeling machine that is electrically powered. The computer was made of local materials. It may be used for domestic and industrial applications. The advantages of using this tool far outweigh the weaknesses. The test results showed that the tool can cut a total of 400 kg of peanuts in one hour. In article [4] concerns the design work of the peanut peeling system with an electric motor. The computer was designed with readily available materials. This can be used for both household and industrial purposes. The advantages of using this tool outweigh the drawbacks. This architecture has great benefits in terms of energy consumption. The power required for the device referred to above is 1 hip, while the traditional machine is 1.98. Our built-in computer is small, thin and compact. It's easy to use, and it can be shipped from anywhere. The bearing is applied to all four axes. No percentage lubrication is required. It is also recommended that the bearing be lubricated regularly with oil. These lubricated bearings are ideal for shafts, but they add costs. In article [5] aim of this research is to design and build an inexpensive peanut decoding machine for home and commercial use in Nigeria. 3.36 kg of roasted peanuts are put into the machine; this gives an average weight of 3.43 kg of roasted peanuts, 0.462 kg of unpeeled peanuts, 0.399 kg of partially peeled peanuts and 0.07 kg of broken peanuts. Average time of 488.8 seconds was reported, with an average peel efficiency of 78.46%. It was found that the longer the peeling time the greater the mass of roasted peanut seeds. The computer is cheap because the local parts are made. Technology, while making low-quality roasted peanut seeds available for home and commercial use in Nigeria, could provide work. In article [6] of research has shown that they can be divided into two groups according to the bombing action. Peanut peeler powered by hand and motor, 50–75 kg per hour. Capacity has been measured while the peanut pedal decorator has a weight of 72 kg / h. In article [7] a peanut peeling machine has been designed and manufactured. It's really cheap, and there's been five peanut tests. Because this machine is designed for small business owners or farmers, the function of this machine is less than that. The peanut cutting operation of the machine is cheaper and faster than the manual process or any other process. The "sheller machine" saves you money, resources and financial contributions to the project and significantly reduces costs and time. This is the backbone of today's global economy. In article [8] looked at the manual peanut decorticator based on previous studies and found that the peanut receives less energy to split and is a
difficult operation. Another view that we supported is that the smaller the size of the sieve hole, the higher the pressure, and most of the pods split. However, the scale of the peeling process should not be small enough to divide the beans [9, 10].

3. Proposed method of the project

3.1. Problems identified
- Time required is high in the traditional method
- Poor efficiency.
- Less Profit earned by farmer.
- High labor cost.

3.2. Objective of the proposed methodology
- Minimize the time needed to remove the peanut shell from the body of the plant.
- Minimize the workforce.
- To make the method more efficient.
- Increase processing performance by removing the peanut shell from the plant body.
- The farmer could grow it with a cheap machine.
- It meets the need to make more money for the villagers.
- The goal of the project is to design and develop an efficient peanut shell separator that will help farmers minimize the time it takes to separate peanuts.
- Reduce the focus of human beings.
- Increase productivity and increase income.
- To minimize the workload.

3.3. Proposed solution of the project
- The goal of the project is to design and grow a cheap peanut collector to help farmers reduce the time it takes to separate peanuts.
- Reduce the focus of human beings.
- Increase productivity and increase revenue.
- Lower workload.

3.4. Advantages of the proposed idea
- Simple to get up.
- This can be easily shared from one location to another.
- The maintenance costs are low.
- Cut the back of your job.
- Reduce printing season.
- Grant real estate farmers.
- The design is inexpensive and simple.

4. Hardware description of the proposed methodology

4.1. Storage
The bearing is a used to limits movement only with respect to the desired movement and minimizes friction. The bearing structure, for example, can provide free linear movement of the moving part or free rotation of the fixed axis; or you can avoid movement by controlling the normal force vectors working on the moving parts. Most bearings facilitate the desired movement by friction. Bearings are usually classified according to the type of operation, the permissible movements or the directions of the loads exerted on the parts.
In the case of mechanical structures, the most basic type of bearing, a flat bearing, is a shaft that rotates in a hole. Lubrication also helps reduce friction. In order to avoid slipping friction, rolling components, such as rollers or balls with circular cross-sections, are placed between the rails or bearing pins of the bearing structure in the ball bearing and the roller bearing. Various bearing designs are available for optimum capacity, reliability, longevity and performance in order to meet the application specifications correctly.

The word "land" is derived from the verb "bring;" the bearing is a machine item that allows one component to be transferred (i.e. transferred) to another. The simplest bearings are storage areas that are cut or partially shaped and have different control over surface shape, thickness, roughness and location. Other bearings are separate devices which are incorporated into the system or part of the system. Highly accurate machines are the most exacting bearings for the most challenging applications. Production requires some of the highest quality modern technology. Animated ball bearing (without cage). The inner ring is rotating, with the outer ring set. There are at least 6 bearer types, each working according to different principles:

- **Simple bearing**, have the shaft that rotates through a cavity. There are different types: grass, slide bearings, bolt bearings, gun bearings and composite bearings. A flat bearing (sometimes referred to as a fixed bearing on the rail) is the simplest type of bearing requiring only one surface and no rolling part. The pin then slides to the surface of the bearing. The shaft rotating in the cavity is the simplest example of a flat bearing. A straight linear bearing may consist of two flat surfaces that allow movement. The drawer, the slide on which it rests, or the paths on the bed. Plain bearings are the cheapest types of bearings in general. They are light and compact, too, and have a high load capacity.

- **Rolling element bearings** in which the rolling elements located between the rotation and the fixed rolling elements avoid rolling friction at very low rolling resistance. The relative movement of the race was triggered, and with little slip. One of the first and best-known bearings is a set of field logs where there is a large block of stone. Once the stone is pushed, the logs roll through the earth in a low sliding friction. When each log comes from behind, it moves forward where the block rolls over it. This course can be emulated by placing a few pens on a table and putting an object above it. More details can be found in the "Bearings" section on the history of the bearings. A bearing with rotating elements uses a shaft in a much larger bore, and the space between the shaft and the bore is firmly filled with cylinders called "rollers." Each roll in the example above functions as a protocol as the shaft rotates. The rollers, however, never fall under load, as the bearing is round.
Other types of bearings are sometimes better for some attribute, but worse for most other attributes, although the power, durability, precision, friction, speed, and sometimes the cost of fluid bearings. Simple bearings are used as often as roller bearings.

4.1.1 Types of laminated element bearings.

4.1.1.1 Storage.
The bearing of the ball is a particularly common type of bearing. The bearing has internal and external tracks between which the balls roll. In general, every race has a rhythm, so the ball is a little loose. Therefore, in theory, the ball comes into contact with each shot through a very narrow area. Loading to an infinitely small point would, however, result in infinitely high contact pressure. During action, as it comes in contact with each hit, the ball deforms slightly (flattens) like a tyre when it comes in contact with the ground. The barrel also leaves a room where each ball presses against it. The ball-barrel touch is therefore essentially excellent and has a finite strain. Also note that the misshapen ball and bump do not roll completely smoothly when rolling at different speeds as different parts of the ball travel.

4.1.1.2. Cylindrical paper.
Conventional roller bearings have slightly longer cylinder diameters. Tapered roller bearings usually have a greater radial load capacity compared to ball bearings, but a lower axial load capacity and higher friction. Load capacity often decreases rapidly when internal and external raceways are misaligned compared to ball bearings or spherical roller bearings. Tapered roller bearings are the oldest known type of roller bearings that date back to Christ at least 40 years ago.

4.1.1.3. Ball roller.
The spherical roller bearings on the outer ring have an internal spherical shape. The middle rollers at the ends are thicker and thinner. However, spherical rollers are difficult to manufacture and therefore expensive, and rollers have more friction than ideal cylindrical or tapered roller bearings, since the rolling components are more slippery between them.

4.1.1.4. Storage of proposed system.
The bearing of the gear is a roller bearing coupled with a planetary gear mechanism. Each element is represented by a concentrated roller and sprocket change with a diameter corresponding to the diameter of the roller and the diameter of the wheel(s). The width of the conjugate rollers and sprockets in pairs is the same. The tow bar consists of dowel or sloping front surfaces for effective contact with the axial bearing. The negative side of this warehouse is the uncertainty. For example, transmission brackets could be used as an efficient mechanism for rotating suspension transmission.

4.1.1.5. Conical role.
These rollers run on tapered tracks using tapered roller bearings. For example, in most wheeled vehicles, tapered roller bearings are used as wheel bearings. This layer has the drawback that tapered roller bearings are usually more expensive than ball bearings due to the difficulty of their processing. In fact, the conical roller is like a wedge under heavy loads, and the loads on the bearings continue to seek to eject the roller; the weight of the collar holding the roller in the bearing increases the friction of the bearings as opposed to the ball bearings.

4.1.1.6. Needle coil.
Needle roller bearings use cylinders which are very long and thin. The ends of the rollers sometimes run towards the points and are used to hold the rollers in captivity, or they may be hemispheric and not in captivity, but are held either by the shaft itself or by a similar arrangement. Since the rollers are small, the outer diameter of the bearing is only marginally larger than its middle opening. But, as they come into contact with the guides, small diameter rollers need to be bent sharply, so that the bearings get tired quite easily.
4.1.2 Types of smooth bearings.

4.1.2.1 Jewelry.
Transparent bearing in ultra-hard glass jewelry material such as sapphire, with one of the bearing surfaces to minimize friction and wear. The jewelry store is a smooth 16, where the metal shaft rotates in a joy-lined rotating cavity.

4.1.2.2 Storage of liquids.
As a non-contact bearing in which the load is transported by gas or liquid, the fluid bearings are bearings in which the load is transported through a thin layer of liquid or pressurized gas which moves quickly between the bearing surfaces. Since there is no contact between moving parts, there is no sliding friction, which means that the friction, wear and vibration of liquid bearings is lower than that of many other bearings.

4.1.2.3 Magnetic bearing.
So that the magnetic field holds up the load. A magnetic bearing is a bearing that holds a charge in a magnetic levitation train. Magnetic pads with no physical contact help move the pieces. Permanent magnets are also used in the combined construction to support the static charge, and the active magnetic pad is used when the floating surface is deflected.

4.1.2.4 Stock flexible.
Creation is reinforced by the collapsing load section. Flex bearing is a heading that allows creation when a heap part is bent. The ordinary adaptable bearing consists of a single segment, which consists of two separate sections. For example, a rotate can be made by attaching a long piece of flexible part to the gateway and the door frame. Another model is the position of the rope attached to the branch. The versatile heading has a bit of slackness over the most extraordinary direction, which is fundamental and, along these lines, sensible. In the same way, they are routinely reduced, lightweight, close to no scouring, and less complex to fix without unusual equipment. Bearing heading is hindered by the obligation and routine limitation of the degree of production of a high weight bearing course. The flex bearing relies on the filler material, which can be curved more than once without dissolving. Regardless, most of the materials fall to bits when they are incredibly distorted. For example, most metal tires have been held in the bowing and at the last long break. Some part of the versatile bearing structure is, as such, designed to avoid a shortcoming. Remember, in any case, that the shortcoming is noteworthy in a variety of ways. For example, rollers and bangs on a moving segment contradict fatigue when they smooth each other out. Bowing the bearing will achieve a low impact and, besides, a very clear touch. Numerous different heading relays on sliding or moving turns of events (course) which are inconsistent at a very basic level, because the bearing surfaces are rarely completely equal. Flexible bearings fold the materials and induce small changes with the aim that granulation is remarkably uniform.

4.2. AC motor

4.2.1. Principle of operation.
The operation of an electric motor, whether it is an AC or DC engine, involves two streams in the light of the fact that the interaction of these two streams has generated the required power, which is the ideal boundary for the pivot of the engine. At the point where the stator twisting of the single-stage off-beat engine is supplied with the substituting liquid, the rotating electrical flow begins to flow through the stator or the primary winding. The rotating electrical flow produces a substituting wave, known as the primary flow. In addition, this basic stream is aligned with the rotor lines and thus cuts the rotor lines. As per Faraday’s electromagnetic enlistment rule, EMF is stimulated in the rotor. The electrical flow continues to travel to the rotor at the point where the rotor circuit is shut. This electrical flow is known as the flow of the rotor. This electrical flow from the rotor makes a transition of its own, known as rotor motion. Since this transition is a result of the acceptance rule, the engine working on this rule was called the enrolment engine. There are currently two streams, one of which is the
primary stream and the other is known as the rotor stream. These two flows generate the perfect force the engine needs to turn.

4.2.1.1. Open belt drivers.
The pulley is rotated in the same direction as the pulley by means of an open belt drive. Power-transmission effects make one side of the pulley wider than the other when the belt drives. For horizontal gearboxes, the narrow side is often held at the bottom with two pulleys, because the curvature of the top significantly raises the folding angle of the belt on the two pulleys.

4.2.1.2. Crossed belt dries.
The cross-belt drive is used to rotate the pulley, which is driven in the opposite direction to the pulley. The higher value of the box allows more power to move than with an open belt drive. Belt deflection and wear are very important.

4.2.1.3. Belt driver benefits.
Belt drives are simple and cheap. You don't need a parallel tree. Belt drives are equipped with overload protection and congestion protection. Noises and sounds have been muffled. The system life increases as the load fluctuations are amortized. They're lubricating free. They require lower maintenance costs. Belt drives are very easy to use (up to 98%, usually 95 percent). They are very cheap if the distance between the trees is very large.

4.2.1.4. Disadvantages of belt drivers.
- For belt drives, the angular velocity ratio is usually not constant due to slip and elongation or is the same as the ratio between the pulley diameters.
- There's an accumulation of heat.
- Center clearance adjustment or use of the diverter roller required

4.3. Plumbing block
A pillow block, also known as bearing structure, it is a foundation for the support of a rotating shaft with compatible bearings and different accessories. The plumbing block generally refers to housing with a roller cushion supplied.

4.4. Steel frame net
The machine consists of a steel frame, an arched perforated screen and three peg-shaped shoes connected to the operating arm. The shoes are cast, arched and fastened to the operating arm. The peanut shells are placed in the hopper and the decortications are carried out with the reciprocating movement of the operating arm. Grains and shells are moving through the filter and can be washed separately.

5. Hardware implementation of proposed methodology
5.1. Explanation of proposed methodology
A 0.5 HP three-phase induction motor drives the ring carriage through the belt drive. Due to this configuration, the ring carriage mounted on the bearing must rotate. The entire tube, the ring carriage and the bearing assembly are mounted on a rigid frame. L-The angles are welded around the periphery of the ring carriage. As a result, one side of angle L projects from the ring carriage. The L angles are so welded that they do not contribute to the dynamic imbalance. Thus, all L-angles are welded by considering dynamic equilibrium criteria.

Once the peanuts with the plant are placed on the side of the L-angles, which are projected out of the revolving ring cart, a startling action takes place. In our unit, stripping is done by placing the pod component of the group on the rotor separator. The vines and the peanuts are placed on the rotor rods and the pods are removed. This is causing a stroke in the nuts. This blow is enough to remove the
peanuts from the plant. Plant debris on hand grip and separate peanuts are dumped by surprising action. At the same time, the three minimum operators can work on this machine. The peanut decorator is driven by the shearing action, the blowing action and the separating action. Next, the inputs, i.e. the peanuts, are fed into the system. Then the peanuts come into contact with the two members, one with a semicircular net and the other with a roller shaft with a smooth wooden core. The semi-circular net is a stationary part, while the wooden roll axis is a rotating part. Once the peanut comes into contact with these two parts, the cutting operation is performed there. Due to the cutting action (crusting), the nuts are shelled and divided into two parts. That's the kernels and the outer shell of the walnuts. Due to the increased weight, the grains are passed down and stored in the separator. However, because of its lighter weight, the peanut shell is thrown out of the machine and recovered from the back of the container. The shelling peanuts are also dropped from the bomb chamber to the tray (7 to 10 percent).

Figure 6. Front view of the propeller floor strain
6. Conclusion and future scope

6.1 Conclusion
The operation of this machine makes it a unique type in comparison to the existing one. The operation was carried out and did not require a highly skilled workforce. The developed pusher unit can be used successfully and efficiently by farmers for the production of peanut seeds. It's saving a lot of time and effort. It can be used for domestic and industrial purposes. In the end, we can conclude from many observations that a semi-atomized machine is a more economical and convenient choice for farmers than a manual machine.

Our peanut propeller and capsule separator should help to increase threshing performance for small farmers. This would also help reduce the cost of threshing and decorating time. The need for more workers is eliminated because only two workers are able to complete the threshing operation. Peanut thresher is useful for the farmer to easily pick up peanut shells in a time-and cost-effective manner. It's portable and it's easy to use. On this basis, it is concluded that the peanut separator peeling machine is the best choice to use the farmer instead of being manually worked. The computer also saves time and energy. The operation of this system is very simple, so that there is no need for special workers to operate a machine.

6.2. Future scope
Cheap peanut defense is a case of medium technology.

- Peeled nuts are available in different sizes. The price per kg of nuts depends on the size of the nuts. It can be attached to the nut outlet of the fuselage for a high-quality nut sorting device.
- If we make an arrangement at the outlet of the tanks, we can control the dust better.
- If we link the transmission chain in the "groundnut sheller” so that we can run it with a toroid instead of a motor.

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