International Journal of Advances in Engineering and Management (IJAEM)
Volume 3, Issue 3 Mar. 2021, pp: 1301-1305 www.ijaem.net ISSN: 2395-5252

Modelling and Assembly of Bluetooth Operated Groundnut Garnering Widget

[1]V.Kalaiselvam, [2]Mohan R, [3]Pradeep Kumar V, [4]Prathi Jaya Shankar Madhukar

[1]*Professor, Dept. of Mechanical Engineering, R.M.K. Engineering College, Tamil Nadu, India*
[234]*Students, Dept. of Mechanical Engineering College, R.M.K. Engineering College, Tamil Nadu, India*

Submitted: 30-03-2021 Revised: 06-04-2021 Accepted: 09-04-2021

ABSTRACT–Mechanized agriculture is the process of using agricultural machinery to mechanize the work of agriculture, in modern times, powered machinery has replaced many jobs formerly carried out by men or animals such as oxen, horses and mules. This groundnut harvesting machine is introduced to change the evolution of the groundnut harvesting process. In order to reduce the burden for farmers this machine gives the product earlier with best quality it works in all different kinds of lands. This process totally reduces the need of labour. Because all, the entire process is done by a single machine, it collects the groundnut and stored in the storage tank. This machine require driver to drive machine and also this model requires reasonable money depends on their work. That machine make simple to handling. That machine helping to agriculture to save the time pride for producing plant. That machine construction simple to other machine. It will greatly benefit from cost effective machines that are suitable for Indian conditions during Groundnut harvesting &handling. We realized that mechanization is essential to overcome labour problems.

I. INTRODUCTION:

Groundnut is major root oil crop and main source of edible oil in the Sudan as well as sesame, cottonseed, and more recently sunflower. Groundnut (Arachis hypogaea L.,) is a native South American legume not known to the Old World in pre-Columbian times. Portuguese navigators are credited with introducing the crop to the western coast of Africa from Brazil, but it is not known when. West African immigrants are believed to have brought the crop to Sudan about 200 years ago, and they grew it in parts of western Sudan and along the Blue Nile. Documentation, however, is lacking. The digger-shaker-windrower is used to lift groundnuts and detach them from the soil. Dig deep enough to prevent cutting pegs. Windrow-inverting attachments orient plants as they leave the shaker so pods are primarily on the top of windrows to permit greater air circulation and exposure to sunlight for a shorter drying time.Mizrachetal carried out a design of machine for digging, picking up, and separating peanut. The technique of machine used depended upon cutting the soil with peanut, plant and elevates all on screen with space equal 10.5 mm between the rods to loosen the soil. Japanese Trade Policy Inst. designed a vibrating potato digger, which named NIP/O. P.S. The machine of one row had a little draft resistance. Ahmed and Shamsudeen developed a prototype tractor - operated groundnut digger lifter.Amin developed a vibrating potato digger having field capacity of 0.31 fed / h, while field efficiency was 91.32 % at forward speed of 2.1 km/h and harvesting feddan of 250 m. length.

Magdy stated that vibrating shares and separating table leads directly to reduce the required draft and increases the performance efficiency. Kang and Halderson designed a two-row, three-point-hitch vibrating digger. Each row compared a pair of four-bar linkages to which two side plates are attached. A bottom plate for each row composed of a soil-digging blade, followed by soil –sieving bars. These bars were rigidly attached to bottom of each pair of side plates to cut and lift the soil and also to allow for soil separation. The motion of the bottom plate was also designed to assist with soil flow. Ademilyi evaluated performance of a tractor drawn groundnut digger/shaker. Kad et al evaluated a performance of a developed digger that can relieve the farmer from fatigues work of hand pulling of groundnut pod and saved 11 to 13 per cent pods. The test results indicated that effective field capacity of the digger as 0.256 ha/day, with 87.98 per cent digging efficiency.

Ibrahim et al. developed a multipurpose digger for root crops. The machine was operated efficiently for potato at 22 cm harvesting depth, 2.6

International Journal of Advances in Engineering and Management (IJAEM)
Volume 3, Issue 3 Mar. 2021, pp: 1301-1305 www.ijaem.net ISSN: 2395-5252

km / h forward speed and 0.31 rad (18 deg) tilt angle with using vibrating movement and for peanut 15 cm harvesting depth, 2.3 km / h forward speed and 0.21 rad (12 deg) tilt angle with using vibrating movement. Munde et al evaluated a performance of bullock drawn groundnut digger suitable for multipurpose tool carrier multipurpose tool carrier. They found that its field capacity was 0.126 ha / hr with field efficiency of 80.25% at an operating speed of 2.1 kmph. It performed the harvesting operation with a total pod loss of 8.01% and digging efficiency 92 per cent. With this digger, the cost of operation was Rs.168.30/ha for groundnut harvesting. Zhengzhou demonstrated a peanut harvester which is mainly used for harvesting peanut, garlic, sweet potato, potato and other crops under the ground. Gary mentioned numbers of tractor operated peanut diggers. The objective of the present work is to design and fabricate a powered groundnut harvester for small and medium size farms.

II. LITERATURE SURVEY

Moayad B. Zaied1, Ahmed M. El Naim2,*, Mohammed H. Dahab3, Afraa S. Mahgoub4

A Powered groundnut harvesting machine was designed and fabricated. The optimum machine diggers were selected using computer simulation method in ANSYS 11 program. The machine was tested in sandy and clayey sand soil. It was found that the effective time and total time recorded by the machine in sandy soil were lower than in clayey sand soil by 0.050 hr. Fuel consumption rate in sandy soil was lower than that in clayey sand soil by 0.7 L / ha. Machine field speed in sandy soil was higher than speed in clayey sand soil by 0.69 km / hr, it was also found that the values of machine theoretical field capacity, effective field capacity in sandy soil were higher than the values in clayey sand soil by 0.061 ha / h and 0.048 ha / h respectively while field efficiency in clayey sand soil was higher than that in sandy soil by 1.2 %. The differences were significant at 0.05 level and it can be concluded that the machine is efficient in harvesting the groundnut crop particularly in clayey sand soil. Hydraulic systemandgearboxwereneededtoenhancemanoeuvrability andtocontrolthedigging speed of themachine**.**

Desa Ahmad and Shamsudeen v. Ghanny

Digging or pulling groundnuts from the ground is a laborious and time consuming hand operation. The use of a mechanical digger will reduce the labour requirement and minimize the drudgery. I his paper describes the development and fabrication of a prototype groundnut digger lifter based on a potato digging machine. The design consists of two digging blades which penetrate under the plant row to loosen the soil and cut the tap root. There are lifting rods on the blades which help lift the plants from the soil and elevate them to the conveyor. The conveyor performs the tasks of separating, shaking and elevating the plants to a discharge unit. The conveyor is powered from the tractor PI O. I he power is transmitted to the conveyor shaft through a chain sprocket transmission system. From preliminary tests carried out, at a speed of 0.9km/hr., the machine has o working capacity of 0. 5ha/hr. with an efficiency of 63%. The estimated output per hectare is 126kg of peanuts.

III. COMPONENT

3.1. Motor

The electrical motor is an instrument, which converts electrical energy into mechanical energy. According to faraday's law of Electromagnetic induction, when a current carrying conductor is placed in a magnetic field, it experiences a mechanical force whose direction is given by Fleming's left hand rule.

Constructionaladcgeneratorandadcmotorareidentical.Thesamedcmachine can be used as a generator or as a motor. When a generator is in operation, it is driven mechanically and develops voltage. The voltageiscapableofsendingcurrentthrough the load resistance. While motor action a torque isdeveloped.

The torque can produce mechanical rotation. Motors are classified as series wound, shunt wound motors.

3.2. Frame

A frame is a structural system that supports other components of a physical construction. Frame is used to carry the total setup of arrangement. It has to able to sustain the total weight of arrangement. It would be joined by arc welding to get permanent joint. So frame is very important to our project. The rolled steel "profile" or cross section of steel columns takes the shape of the letter "I". The two wide flanges of acolumnare thicker andwiderthantheflangesonabeam, to better withstand compressive stress in the structure. Square and round tubular

International Journal of Advances in Engineering and Management (IJAEM)
Volume 3, Issue 3 Mar. 2021, pp: 1301-1305 www.ijaem.net ISSN: 2395-5252

sectionsofsteelcanalsobeused,oftenfilledwithconcrete.Steelbeamsareconnected to the columns with bolts and threaded fasteners, and historically connected by rivets. The central "web" of the steel I-beams is often wider than a column web to resist the higher bending moments that occur inbeams.

Wide sheets of steel deck can be used to cover the top of the steel frame as a "form" or corrugated mold, below a thick layer of concrete and steel reinforcing bars. Another popular alternative is a floor of precast concrete flooring units with some form of concrete topping. Often in office buildings, the final floor surface is provided by some form of raised flooring system with the void between the walking surface and the structural floor being used for cables and air handling ducts.

3.3. Battery

In isolated systems away from the grid, batteries are used for storage of excess solar energy converted into electrical energy.Theonlyexceptionsareisolatedsunshine load such as irrigation pumps or drinking water supplies for storage. In fact, for small units with output less than onekilowatt.

Batteries seem to be the only technically and economically available storage means. Since both the photo-voltaic system and batteries are high in capital costs

3.4. Wheels

Wheels must be strong enough to support the vehicle and withstand the forces caused by normal operation. At the same time, they must be as light as possible, to help keep un-sprung weight to a minimum. Wheels can be made from cast aluminium alloy or magnesium alloy. Alloy wheels are popular because of their appearance and because they are lighter than similar steel wheels. Aluminium is a better conductor of heat, so alloy wheels can dissipate heat from brakes and tyres more effectively than steel ones. Mostwheelshaveventilationholesintheflange,soaircancirculatetothebrakes.Most passenger car wheels are of well, or drop-centre design. This design allows for tyre removal and fitting. The removal and fitting of tyres should be carried outaccordingto manufactures instructions.

3.4. Bearings

Ball and roller bearings are used widely in instruments and machines in order to minimize friction and power loss.A ball bearing usually consists of four parts: an inner ring, an outer ring, the balls and the cage or separator.

To increase the contact area and permit larger loads to be carried, the balls run in curvilinear grooves in the rings. The radius of the groove is slightly larger than the radius of the ball, and a very slight amount of radial play must be provided. The bearing is thus permitted to adjust itself to small amounts of angular misalignment between the assembled shaft and mounting. The separator keeps the balls evenly spaced and prevents them from touching each other on the sides where their relative velocities are the greatest. Ball bearings are made in a wide variety of types and sizes. Single-row radial bearings are made in four series, extra light, light, medium, and heavy, for each bore.

3.5. Arduino

Arduino is an open-source hardware and software company, project and user community that designs and manufactures single-board

International Journal of Advances in Engineering and Management (IJAEM)
Volume 3, Issue 3 Mar. 2021, pp: 1301-1305 www.ijaem.net ISSN: 2395-5252

microcontrollers and microcontroller kits for building digital devices Arduino board designs use a variety of microprocessors and controllers. The boards are equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards ('shields') or breadboards (for prototyping) and other circuits. The boards feature serial communications interfaces, including Universal Serial Bus (USB) on some models, which are also used for loading programs. The microcontrollers can be programmed using the C and C++ programming languages, using a standard API which is also known as the "Arduino language".

IV. IMPLEMENTATION

The major parts of ground nut harvesting machine are bucket hands, shaft, steel barrel and Arduino kit.The buckets are connected to the shaft and the shaft is connected to the 12v dc motor, when the motor runs the shaft will rotate and bucket hands will collect the groundnut plant from the soil.

The steel barrel is placed beside the bucket hands to store the groundnut plant.The steel barrel is designed in
such a way that it will help to pass the bucket hands through it.

The above mentioned set-up are placed in a square tube frame consisting of four wheel. The rear wheels are connected to a servo motor to increase the pulling capacity of the vehicle.The servo motor connected to the wheels and 12v dc motor connected to the shaft are operated by Bluetooth encompassed Arduino kit. With help of this we can control the movement of the vehicle and rotation of the bucket hands.

V. CALCULATION

5.1 POWER CALCULATION:
Power, P= 2∏ NT/ 60
Speed required
N = 100 rpm
P= 2∏* 100*17.25/60
P= 180 W

5.2 SHAFT CALUATION:
Allowable stress of MS isƮ = 40N/ mm2
T = π τ d^3 / 16
17.25 = 3.14* 40* d^3 /16
d = 12.7mm
In order to do weld attachment on the shaft, diameter of the shaft is chosen to 16 mm.
Diameter of shaft, d = 16 mm and Shaft of length, L = 300 mm

5.3. BEARING CALCULATION:
Bearing No. 6202 (Data book page.no 4.13)
Outer Diameter of Bearing (D) =35 mm
Thickness of Bearing (B) =12 mm
Inner Diameter of the Bearing (d) =15 mm
r_1 =Corner radii on shaft and housing
r_1 = 1(From psg design data book)
Maximum Speed = 14,000 rpm (From psg design data book)
Mean Diameter (dm) = (D + d) / 2
= (35 + 15) / 2
Dm=25 mm

VI. CONCLUSION

The Groundnut harvesting machine is a useful machine which saves time and energy of the farmer also it reduces the cost and increase the yield. If the farmer has to harvesting the groundnut manually the time taken to harvest one acre of land

is approximately 8 hours [1] can shell a total of 100 kg of groundnut in a day. This harvesting machine makes the reduction effort to harvest 300kg to 400 kg of groundnut in a day. In future we are planning to separate groundnut from the plant while doing harvesting itself.

REFERENCES

[1]. Mahmoud, A. M. Mohamed, O. K. Mohamed, A. K. Abdel Moneim, B. E. Hassan, A. M. El Tahir, I.M. "Crops of Sudan". Country Report" FAO International Technical Conference on Plant Genetic Resources. Khartoum, March 1995 p: 1-83, 1995.

[2]. Mizrach, A. Margolin, A., Feller, R. and Alper, Y. Peanut salvage machine for sandy loam and clay soils. Trans. ASAE, 26 (2): 389391, 1983

[3]. Ahmed, D. and Shamsudeen, V.G. "Development of a prototype tractor-operated groundnut digger" lifte. Peratanika, 10 (2): 219223, 1987

[4]. Amin, E. "Mechanization for potato production on small farms". Ph.D.Thesis, Agric. Eng. Dept Fac. of Agric., Mansoura Univ, 1990.

[5]. Magdy, M.A. A. "Mechanization of potato harvesting". Ph.D Agric. Eng. Al-Azhar Uni., 1991.

[6]. Kang, W.S., Halderson, J.L. "A vibratory two-row potato Digger" Applied Engineering in agriculture. 7 (6): 683-687 1991.

[7]. Ademilyi, Y.S. James, D., Ozumba, I. C, Olowonibi, M. M. "Performance evaluation of a Tractor Drawn Groundnut Digger/Shaker". NCAM Research Publication, P: 115 - 122, 2004.

[8]. Kad, V.P., Nikam, S.P, Salve, V.A. "Performance evaluation of power tiller drawn groundnut digger". International journal of Agricultural Engineering, 1 (2):107-109, 2008.

[9]. Ibrahim, M. M., Amin, E., Farag, A. "Developing a Multi Purpose Digger for Harvesting Root Crops". Misr J. Ag. Eng., 25 (4): 1225-1239, 2008.

[10]. Munde, P.A Nadre, R.G., Sawant, B.P. "Performance evaluation of bullock drawn groundnut digger suitable for MAU multi purpose tool carrier". International journal of Agricultural Engineering, 2 (1): 157-159, 20092010

[11]. Faculty of Mechanical department 2014, 'PSG Design Data Book', Compiled by PSG College of Technology,Coimbatore-641004.

International Journal of Advances in Engineering and Management
ISSN: 2395-5252

IJAEM

Volume: 03 Issue: 03 DOI: 10.35629/5252

www.ijaem.net
Email id: ijaem.paper@gmail.com