Seeding Machine

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ABSTRACT

The tractor runs on fossil fuel, emitting carbon dioxide and other pollutants every second. This has resulted in extensive air, water, and noise pollution, as well as a genuine energy problem in the near future, in order to make our farmers' and nation's growth sustainable while causing less harm to environment. Now, the goal of this project is to create an autonomous Chickpea Seed Sowing Robot that will save labour costs and time spent digging while also running on renewable energy. A 12V battery is employed in this robot to translate revolutions to distance, which then provides the necessary energy to a DC wiper motor. After that, the power is transferred to the shaft, which drives the wheels. In order to reduce labour reliance even more, IR sensors are utilised to manoeuvre robots in the field. The seed sowing and digging robot will travel over various ground contours, digging and sowing seeds.

Key words: Seed Sowing Machine, Low Cost Automation, Chickpeas Seed

Chapter 1 Introduction

Most nations in the present generation lack adequate qualified manpower, particularly in the agricultural sector, which has a negative impact on emerging countries' progress. The primary goal of automation in our nation is to minimise manpower; the keyword in all industrial businesses typically refers to electrical, electronic, and mechanical components. Automation eliminates a lot of time-consuming manual labour and speeds up production. As a result, it is the moment to automate the sector in order to solve this issue. In China, 70% of the population is reliant on agriculture. Since prehistoric man cultivated the first crop plant, seed has been an essential agricultural product. The seed sowing procedure is automated in this model to decrease human effort and boost production. Seeds are planted mechanically with the help of a DCmotor.

Cropping is a crucial and time-consuming operation for every farmer, and since it is so time-consuming on a big scale, it necessitates the hiring of additional personnel. As a result, farm equipment were created to make human labour easier. We obtain poor seed placement, lower spacing efficiency, and considerable back discomfort for the farmer when we use the manual technique of seed planting. This also restricted the size of the field that could be sown. As a result, in order to get the greatest results from a seed planter, the aforementioned parameters should be tuned. As a result, competent design of the agricultural machine is essential, as is the selection of components on the machine to meet the demands of the crops. Agriculture is the backbone of China's economy. Agriculture development is also important for China's long-term prosperity. China has a large population that is rising every day, increasing the need for food. We noticed a variety of machinery in agriculture. Traditional techniques are also available. Traditional methods have been employed in China for a long time. China too has a large workforce.

In China's countryside, this method of planting by hand is quite prevalent. However, this technology is exceedingly difficult to use on a wide basis. The farmer will have to devote more time to planting. However, he has less free time. As a result, it needs more manpower to perform the work within the allotted time, which is more expensive. During hand planting, there is also increased waste. As a result, there is a

need to build a machine that would assist the farmer in reducing his planting efforts. Mechanization is the term for the process of utilising machinery. Automation, in addition to mechanisation, aids in increasing process efficiency. The robotic system is an electromechanical (in the sense that it has its own agency) and artificial agent that is guided by a four-wheeled DC motor. The farm is cultivated by machine, depending on the produce and taking into account specified rows and columns. The infrared sensor detects obstacles in the path and senses the vehicle's turning position at the end of the land. Water pressure may be used to identify and solve the seed block. The machine may be operated remotely, and the DC battery is charged using a solar panel. In order to programme the microcontrollers, assembly language is utilised. With the aid of a DC motor, the microcontroller is employed to regulate and monitor the system motion of the vehicle. Because agriculture is heavily reliant on technical means such as seeding, mowing, and harvesting machines, it is widely regarded as a field with a high potential for robotic application, as it is only a short step from these semi-automated machines to fully autonomous robots in both greenhouse and open field applications. In various agricultural applications, robots are available at different stages of development, from experimental to market-ready, although the majority of them are still in research, where institutions have made headway in extending conventional agricultural machinery to robotic systems. The majority of the robots discussed in this article are designed for harvesting. Seeding isn't as necessary as it once was since there are now excellent tractor-based seeding methods. In comparison to agriculture, there are much less robotic uses in horticulture.

Cropping is a crucial and time-consuming operation for every farmer, and since it is so time-consuming on a big scale, it necessitates the hiring of additional personnel. As a result, farm equipment were created to make human labour easier. We obtain poor seed placement, lower spacing efficiency, and considerable back discomfort for the farmer when we use the manual technique of seed planting. The amount of the field that could be planted was likewise constrained as a result of this. As a result, in order to get the greatest results from a seed planter, the aforementioned parameters should be tuned. As a result, we must design the agricultural machine properly, as well as pick the components of the machine to meet the demands of the crops.

China's agriculture is the country's backbone. Agriculture development is also critical for China's long-term prosperity. China has a large population, and it is growing every day.

As the population grows, so does the need for food. We noticed a variety of machinery in agriculture. Traditional techniques are also available. Traditional methods have been employed in China for a long time. China too has a large workforce. In China's countryside, this method of planting by hand is quite prevalent.

The farmer will have to devote more time to planting. However, he has less free time. As a result, more manpower is required to perform the work within the allotted time, which is more expensive. During hand planting, there is also greater waste. As a result, it is necessary to create such a system.

A equipment that will assist the farmer in reducing his planting efforts. Mechanization is the term for the process of utilising machinery. Automation, in addition to mechanisation, contributes to the process' effectiveness.

1.1 Development status of Seeding machine at home and abroad

A seed sowing machine is a device that assists farmers in spreading seeds in the correct place, therefore saving time and money. The primary goal of a sowing operation is to plant seed and seedlings in rows at the required depth and seed-to-seed spacing, encompass the seeds with soil, and compress the soil over the seed. The study examines many features of seed sowing machines that will aid in the agricultural industry's transition to automation [1.3].

China's agriculture sector has traditionally been the basis of its long-term growth. As China's population continues to increase, so does the need for products. As a result, there is a larger demand for multiple cropping on farms, which necessitates the use of efficient and high-capacity machinery. Because of a lack of expertise and the absence of modern equipment and machinery, agricultural mechanization in China is still in its early stages. Seeds are disseminated manually, furrows are opened with a plough, and seeds are dropped by hand in ancient ways.

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larger demand for multiple cropping on farms, which necessitates the use of effective and time-saving devices. The study explores several kinds of seed sowing machines that will aid in the agricultural industry's transition to automation [4-6].

The machine has a good operating effect, and it has the capability of doing many operations at once, such as stubble, rotational tillage, and ridge raising, lowering farming costs and reducing the number of times the tractor accesses the field. The machine features a well-designed construction, a balanced force, a unique power transfer, is light, and has a cheap production cost.

The assembling procedure is broken down into the following different steps:

Step 1: Oil the apparatuses, including the gear, to eliminate any metallic imperfections or dirt.

Step 2: Remove any external objects.

Step 3: Fasten a first wheels to the constructed edge (diameter = 2000mm).

Step 4: Finally, attach the shaft to the edge.

Step 5. Balance frame by mounting smaller wheel to the back and front sides of the frame.

Step 6 Now mount bearing (such As. 6202) to the shaft plus for decreasing the friction plus stress.

Step 7: Attach two motors to either side of frame (such As. front and back).

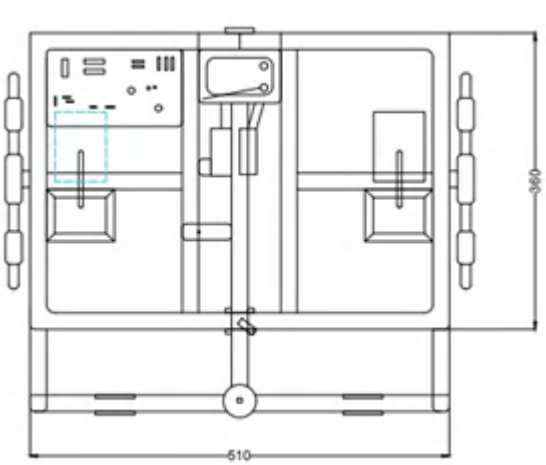
Step 8: After motors have mounted, wire the larger spur gear by lesser spur gear that has been attached to motor.

Step 9: Attach seed dropping disc plus hopper to mid shaft.

Step 10: Finally, secure plus connect ploughing orientation.

Step 11: Attach the microcontroller to frame.

Step 12: Using wires, attach the motor link to the microcontroller.



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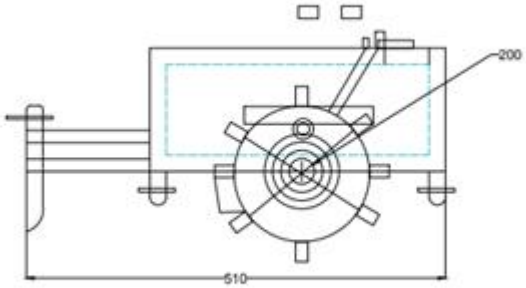

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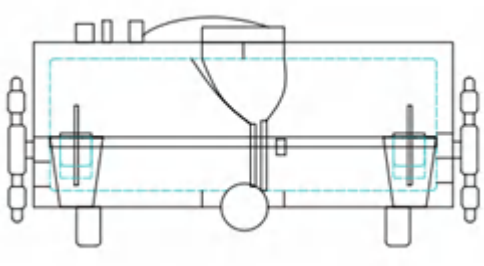

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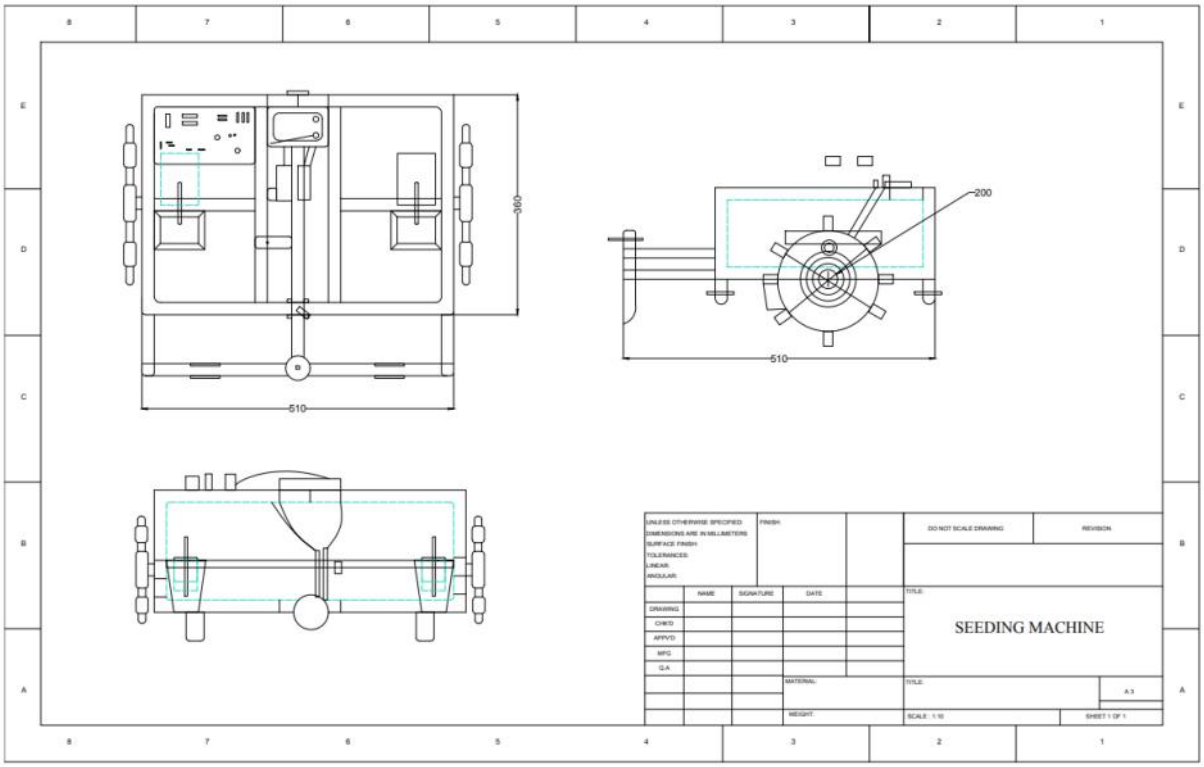


Figure No. 5: Two D figure of final association

1.2 Similarities and differences between Traditional and Automatic machine

Broadcasting by hand, creating furrows with a country plough and dropping seeds by

hand, and depositing seeds in the furrow with a bamboo/metal funnel connected to a country plough are all traditional ways. Dibbling, or cutting holes or slits with a stick or instrument and dumping seeds by hand, is used for sowing in tiny areas. Traditional multi-row seeding equipment with manual seed metering are very popular among experienced farmers. It is impossible to ensure consistent seed dispersal when sowing by hand. A farmer may plant at the proper seed rate; however seed distribution is likely to be inconsistent across rows and within rows, resulting in clumping and gaps in the field.

It is impossible to ensure consistent seed dispersal when sowing by hand.

Even if a farmer sows at the intended seed rate, the interrow and intra-row dispersion of seeds is expected to be unequal, leading in bunching and gaps in the field.

Because two people are needed to drop seed and seed, the labour requirement is significant. Inaccuracies in seed placement have a bigger impact on plant stand in crops. China is destined to be an agriculturally oriented country, with around 35 percent of the people relying on farming wholly or partly [7].

For centuries, our farmers have used the same tools and procedures. For example, seeding, spraying, and weeding. To increase output, there is a want for the creation of efficient spraying and weeding machines. In comparison to industrialised countries, most Asian emerging countries have the dilemma of high population and low land productivity [8].

Insufficient electricity availability on farms and low levels of agricultural mechanisation are two of the key causes for low productivity. This is particularly true in China. Agriculture must be modernised in order to fulfil the food needs of a growing population and fast industrialization, which is now widely recognised across the world. Many farms' output is believed to suffer as a result of poor seed sowing and delayed planting, harvesting, and threshing. Mechanization allows for input conservation by guaranteeing better distribution, lowering the quantity required for improved response, and preventing losses or wasting of applied resources [9].

By increasing output and conserving input, an automatic machine lowers the unit cost of manufacturing. The government's agricultural tool and machinery programme has emphasised selective automation in order to maximise the utilisation of animal, human, and other forms of power. To satisfy the demands, measures were taken to expand the availability of tools, combine harvesters, irrigation pumps, power

tillers, tractors, and other power-driven machinery, as well as the development and availability of better animal-drawn implements.

More than 40% of farmers fell into the small and marginal group, therefore this was given special attention. Small farm mechanisation is often thought to be challenging. However, despite having a land holding that is much smaller than ours, China's agricultural has reached new heights thanks to effective automation. Small farmers required to be encouraged to employ contemporary time-saving machines/implements of suitable size in order to reduce drudgery, boost efficiency, and free up time to engage in additional/supplementary producing activities.

Seed sowing machines that are automatic have been created. They have concentrated on the seed planting technique in this suggested project. To avoid the difficulties in this seed planting procedure. The seed sowing machine has been designed at a low cost. The automated seed sowing device may even be operated by an inexperienced farmer.

For a highly innovations agriculture technique that integrates robotic-based cultivation, researchers have demonstrated a faster performance in terms of speed and a better Seed Sowing capacity. A robotic system for agriculture is employed. They made use of a four-wheeled DC motor. The Plow machine cultivates an agricultural farm, taking into account precise rows and columns depending on the crop. The blocks on the path are detected using an ultrasonic sensor, which measures the distance among the robot and the block. At the conclusion of each column, it also detects our vehicle's turning position. Water pressure can be used to detect and overcome the seed block. This gadget can be operated from afar. To decrease human labour, a sensor-guided robot rover for digging, accurate seed placing, and sowing has indeed been suggested [7-9].

To automate fruit segmentation, authors introduced a multi-class picture segmentation. The suggested method is used to segment fruits. For a robotic agriculture monitoring mission, this is an issue.

Researchers have demonstrated a solar-powered autonomous seed-sowing mechanism. Farmers in the village rely on agriculture for the majority of their income. Utilising solar energy, an automatic seed sowing machine completes the tasks of excavating, seed planting, watering, and fertilising. The farmer will benefit from this mechanised seed sowing system. They may also carry out their usual agriculture

activities while saving fuel to a greater extent. At the very same time, harnessing solar energy can help to minimise pollution in the environment.

1.3 The main problems

The main problems faced in projects:
Level 1: Sowing in a Straightforward Line: When sowing, this is critical to sow in a single direction. This is not always likely to seed in a conventional line during trials.
Level 2: Unequal Seed and Fertilizer Distribution: Where the land is not correctly levelled (by some highs and lows or where there are large stones in the way, there is an unequal distribution of seed and fertiliser.
Level 3: Speed of Operation: When it comes to uniform sowing, operating frequency is critical. The faster the operation, the more uniform the sowing will be, giving in a larger yield. During sowing, the speed of work fluctuates on a scale.
Level 4: Seeds and Fertilizers Remaining Open to the Atmosphere: At some locations, seeds and fertilisers have remained open to the atmosphere, which is detrimental to seed germination. It's because the land hasn't been properly levelled, or the chain used to cover the seeds isn't working properly.
Level 5. Non Uniform level of the seeds sown: level of seeds sowed remains different on various areas. The effort provided to the device should be as consistent as possible to ensure uniform seed depth.

1.4 Development Trend

(1) To develop into a multi-purpose machine

To fulfill the demand of farming in various operational environments, the machine can complete numerous operation functions at once, such as an automatic sowing machine, or can finish a variety of activities and operations by substituting the machine's structure, reducing agricultural machinery investment, improving production efficiency, and lowering operations costs.

(2) Development towards low power consumption and high efficiency

Various research are currently focused to minimising machinery power consumption, efficient and rational resource and energy usage, increasing manufacturing technology, efficiency, and service life, adopting sustainable development methods, and establishing a preservation society.

1.5 Main work of this thesis

Consult relevant internally and externally literature, grasp the status of straw returning technology development at home and overseas, build a rotating tillage ridge hoist, then enhance and complete the design plan, and compute The primary contents are as follows:

(1) Determine the overall structure of Automatic sowing machine

(2) Determine the transmission scheme of the whole machine and carry out design and calculation;

(3) Design and draw typical parts.

(4) Output part drawing, assembly drawing and other drawing;

(5) Summarize the research content.

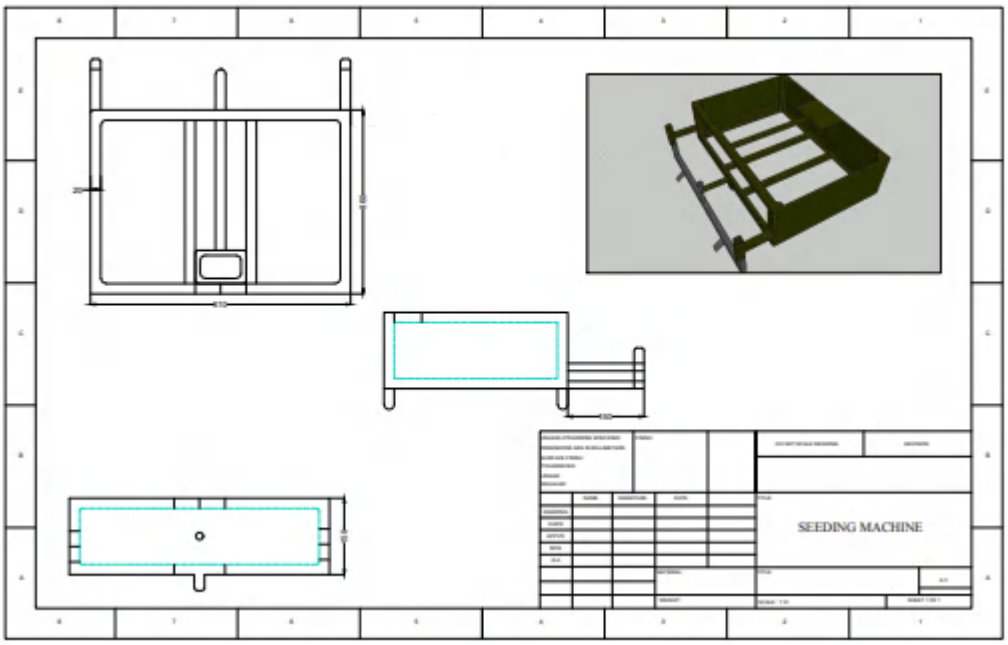
CHAPTER 2 Overall design

2.1 Whole machine structure and working principle

Research begins by a review of the prerequisites as well as the current agricultural

seed planting procedure. This research will involve an overview of the present manual and automatic seed planting processes, as well as the development of an initial design concept for the suggested new seed planting method [10].

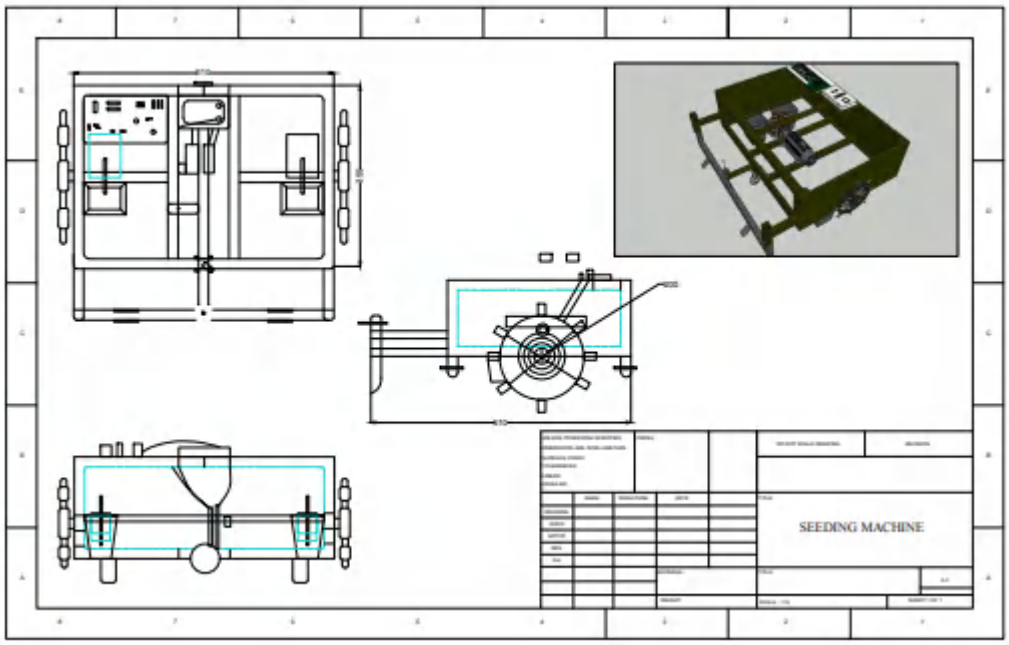
Step 1: Conduct a comprehensive literature review to learn more about the seed planting procedure, seed planting automation, and new breakthroughs in seed planting technologies. Access to the reference materials, internet, technical journals, research papers, and other related sources of information are used to complete this assignment.



Step 2: A suggestion for the scheme of a sowing appliance will be created after gathering necessary all important facts and knowledge about seed planting operations and automation. It will comprise a proposed schematic architecture of a seed planting machine that takes into account all of seed plus planting process requirements.

Step 3: Precise plan of the various components plus sub-assemblies necessary to producing plus manufacturing seed planting machine will follow the schematic layout.

Material conditions on behalf of individual elements and technical requirements of standard purchased out portions will determined when the assembly's functioning requirements have been verified. Design will be assessed on behalf of its safety plus functionality.



Step 4: After design is finalized, the next step is to manufacture the elements and fabricate the various sub-assemblies, taking into account their production suitability and necessities, i.e. processes and machines requisite, receiver, microcontroller plus transmitter selection, and part examination.

Step 5: Assemble parts and components and connect them on a unified stage to complete seed planting instrument.

Step 6: Programming and testing the microcontroller

The basic list of guidelines tailed by the automated seed sowing robot while action is as below: autonomous control algorithms

1. Take first step. The LCD panel has been set up and programmed to request input ethics.

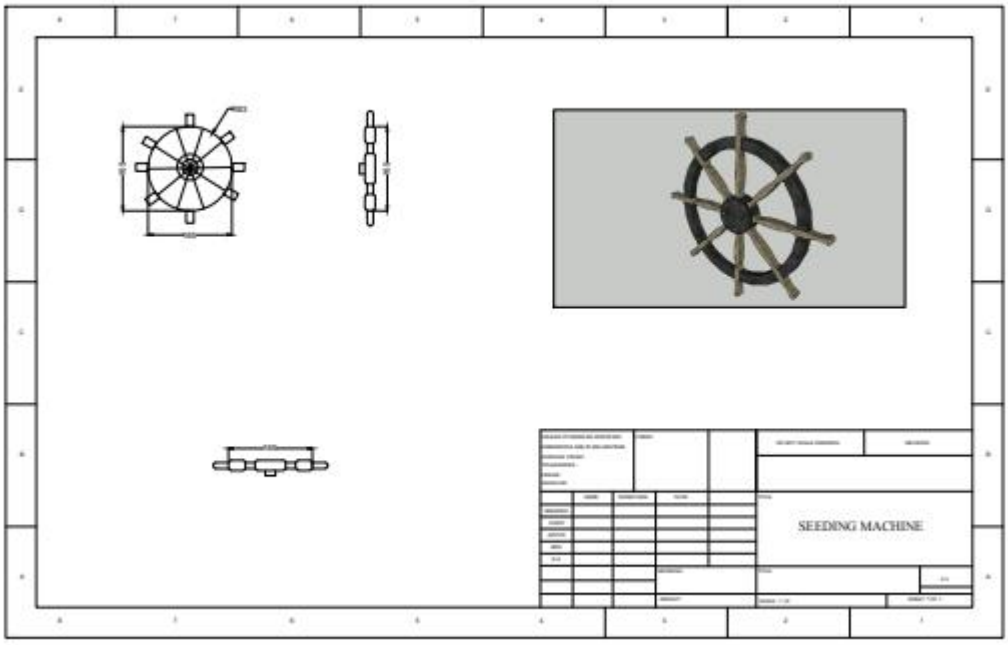
Step two: Inductive closeness device is now activated to verify and fulfil given teaching.

Step 3: The relays and, as a result, dc wipers motors on behalf of robot dislocation are controlled.

Step 4: The Infrared sensors function is also called and verified for any interruptions in each of the preceding steps.

Step 5: If anything is found, the robot is instructed to break until the disruption resolved.

Step 6: After completing mission, the robot comes to a complete halt.



2.2 Working

Step 1: The LCD display prompts you to enter the number of revolutions you want wheel to do in straightforward plus right route at the same time.

Step 2: An inductive proximity sensor detects the spins of the wheels as data is

delivered.

Step 3: Primary drive is provided by a 12v d.c wiper motor by a low rotation and high R.P.M. Step 4: Two spur gears rotate; the speed slows also the torque rises. Step 5: Motion is then moved to the shaft plus then to the wheels.

Step 6: Because seed falling disc is coupled to the shaft, it rotates by the wheels.

Step 7: At the similar time as the kernels are planted in the ground, the plough makes furrows in soil. Step 8: Determine the space of two kernels.

Step 9: If an obstruction is found in the robot's clear pathway, IR sensor detects it, plus robot comes to a halt until the path will have cleared.

Figure no.7: The Chickpeas Seed Robot

Chapter 3 Typical parts design

3.1 Mechanical components and description Selection of motor

Because our core premise is to decrease speed while increasing rotation, we need a great rpm, low-cost dc motor. As a result, we chose this dc wiper motor because it meets our design requirements and is readily available on the market. In which the power and torque were calculated according to our needs.

3.1.1 Spur gear design and selection

Compute forces on helical gear teeth, with impact forces due to speed and consents.

Step 1:

Calculate the allowed force on gear teeth, taking into account parameters that are required owing to the direction of involute of the tooth shape and the resources used for mechanisms.

Step 2: Create actual gear systems, incorporating material specifications, industrial precision, and additional helical gear design requirements.

Step 3: Recognize plus calculate the required apparent unevenness of gears to reduce or eliminate surface wear.

Step 4: Learn in what way lubrication can cool and lessen the effect on gearing systems.

Step 5: Choose from a variety of standard gears from stocking manufacturers or wholesalers. Step 6: The Diametric Terrain (P) - Field Circle Diameter (PCD) and the Amount of Teeth were computed (N).

3.1.2 Seed sowing disc and Seed bucket.

Primary function of disc is to scatter seeds across the field. Based on reviews we conducted to determine the space of two seeds, while we have determined that average gap between adjacent seeds is 2.5 to 3 inches. So, based on that computation, we chose to set the distance as follows:

Figure 1: Seed sowing disc and hopper

3.1.3 Rudder Control

The storage device is among the most important components of the process. It's also designed to support the robot's weight as well as the requisite planting capacity. This element is positioned in a permanent place. At the bottommost of the container, seed sowing discs are placed. Disc serve as a seed dispersion device since just one seed descends from the container for each full rotation of the revolving wheel. Depending on the needs, the amount of seeds that drop from the tank changes. The seeding route is consistently opened by this disc, allowing for smooth and accurate sowing.

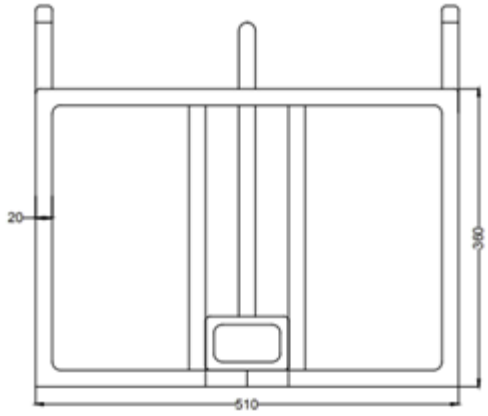
3.1.4 Ploughing arrangement

Dig land and sprinkle seed, digging plates were utilised. The plate has four holes in it. It's for mounting by a rod. Mild steel is used to make digging plates. These plates are bolted and nutted in front of the seeds container and connected in the rod at a specific distance. We can change the location of plates by modifying the bolts and nuts. Bolts and nuts secure the rod to the bearing mounting plate. It's simple to deconstruct and reassemble.

Figure 2: Ploughing arrangement

3.1.5 Frame

The equipment's backbone is the frame. It is constructed of mild steel. The shaft houses all of the equipment's sub-components. It's the hard structure that acts as a skeleton, holding all of the essential components together. The seed container assembly is positioned on the bottom end of a frame wheel.



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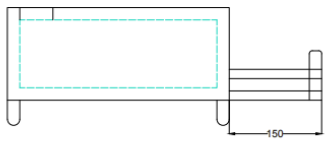

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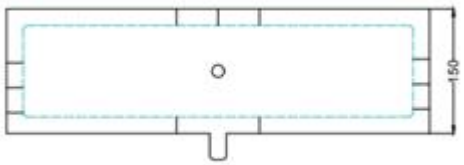

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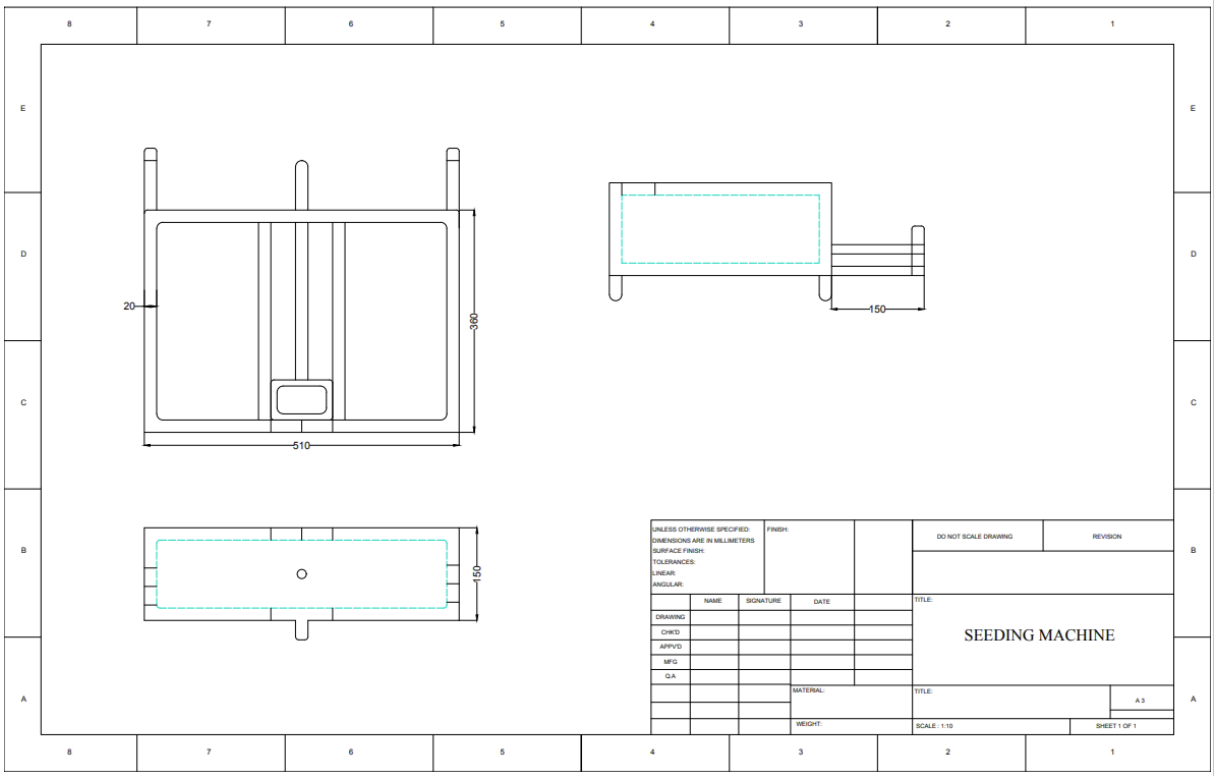

Figure no.3: Design of the frame

3.1.6 Bearing by cap

Major reason for using bearings is to minimize rotational resistance and support

radial and axial loads. Rolling bearings used rolling essentials to keep the parting among stirring portions. The shield protects the bearing's working parts from any environmental debris that could impair the ball bearing's speed and lifespan. Agricultural machinery, conveying apparatus, robotics, dental machinery, elevators, textile machinery, ship rudder propellers, and aggregate crushers are just a few of the applications for rolling bearings.

Figure no. 4: Bearing

3.1.7 The PIC Microcontroller (16F877A).

PIC microcontroller (PIC16F877A) is well microcontroller in the business. This controller is simple to use, and programming or coding it is equally simple. One of the primary advantages of using FLASH memory machinery is that this may write-erase so more times as necessary. It has total 40 pins, 33 of which are used for input and output. PIC16F877A is used in a lot of pic microcontroller's applications. In addition to digital power electronic circuits, the PIC16F877A is frequently employed. The PIC16F877A is used in variety of devices. It's use in secluded sensors, safety and

stability devices, home automation, and an extensive range of manufacturing instruments. It features an EPROM, which enables to store including transmitter codes and functional wavelengths, as well as other related data, indefinitely. The cost of this controller is so low, and it's easy to be used. It's versatile, plus it could be used in places where microcontrollers will have never been used before it, such coprocessors and clock functions.

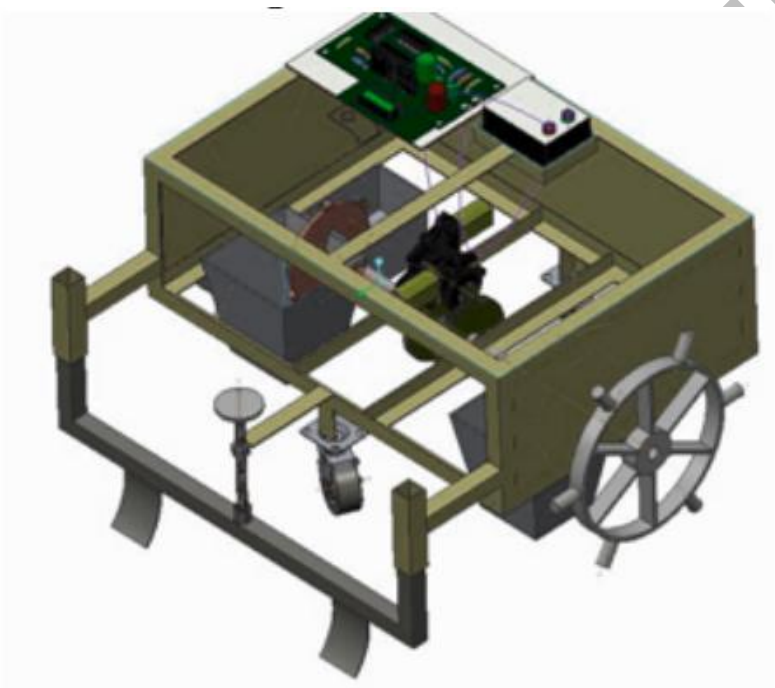

Figure No. 6: Three D diagram of last association

Chapter 4 Design and calculation steps of roller chain drive

The kernel sowing robot was put to the test.

Trail 1: The relay driver circuit was burned due to a faulty power supply. The balancing issue was discovered while the robot was being tested in the soil. Trail 2's soil type is medium. 40-45cm depth of soil, 20 Moisture in the soil and 1-2cm is the average depths of sowing obtained.

25cm row spacing was achieved. 2.5 to 3 inch distance between every seed dropped the automated seed sowing robot was put through its paces for two rotations: one in an honest line plus another later making right bend. 60 seeds are expected to place in dirt.

Chapter 5 Summary

The fact that it does not require any electric power and is independent of tractors or bullocks, both of which are out of reach for most impoverished farmers, emphasises its cost-effectiveness. Farmers have difficulties during the peak planting season due to a lack of bullocks and tractors. As a consequence, they are enticed to hire them at a greater salary. The use of a hand-controlled seed cum fertiliser planter can dramatically minimise yield loss. The most notable advantage of a physically operated seedcum fertiliser planter is that it may be easily driven by one person. Personnel are rarely in short supply in rural regions, as the typical family size is large. Thus, if two to three workers are hired to do the seeding, the area covered can be expanded. When it comes to most farmers' needs, this seed and fertiliser planter can efficiently meet the majority of them during the high season. The machine's low cost, as well as its capacity to simultaneously plant and fertilise, is undoubtedly a gift to farmers, saving them a great deal of time. It leads in a nearly 60% reduction in operational costs and a 15% reduction in seed requirements. It can be demonstrated that the equipment is useful to poor farmers if it is commercially utilised.

Following the completion of the field testing and analysis of the results, the potential for future study is as follows: The required depth of a seed to also be sowed should be raised by around 8 cm for better and stronger germination. As a result, a various

types of furrow opener by wider breadth can be utilized to achieve the required seed depth, resulting in a higher yield. In terms of ergonomics, we can utilize two distinct types of RF modules instead of relays. An acre metre can also be mounted on the machine's top to determine the machine's coverage area. We can utilize bigger capacity RF modules to operate machinery at a greater distance for a longer range of remote control. We put tiny water reservoir near the rear construction to supply water to seed before fertilizers for water distribution.

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