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Fabrication and Development of An Automated Seed Sowing Machine

Abstract- The contemporary world is advancing towards the rapid expansion of all industries, including agriculture. The agricultural industry is transforming the social and economic landscape of the people as a result of globalization. Agriculture is the most extensive economic sector demographically and significantly contributes to the entire socio-economic structure of India. In India, the majority of the population lives in rural areas and is reliant on agriculture, using outdated techniques (traditional methods). The traditional approach is less efficient and more time-consuming. To satisfy future food demand, farmers must adopt innovative techniques that preserve soil texture while enhancing crop productivity. To address the limitations of traditional methods, we are designing a seed sowing machine capable of executing many functions. The primary function of our equipment is to mechanize the processes of excavation and seed planting at appropriate intervals and depths. The usual sowing technique in agriculture often requires more time and work. The seed feed rate is higher; nevertheless, the total operational time is extended, resulting in greater overall costs owing to manpower and equipment rental. The traditional seed sowing machine is inefficient and time-consuming. This research examines the several sowing techniques used in India for seed dissemination and fertilizer application. A comparison between the conventional sowing technique and the newly suggested machine, which can execute many simultaneous operations and offers several benefits. As manpower availability increasingly concerns farmers and labor costs rise, this equipment minimizes the effort and overall expenses associated with seed planting and fertilizer application.

Keywords: Fabrication, Seed sowing Machine,

INTRODUCTION

As of this moment in time, the majority of nations do not have sufficient numbers of skilled workers in the agriculture sector, which is a barrier to the growth of developing nations. It is time to automate the agricultural business in order to solve this problem by using cutting-edge technology for operations related to food production. The primary purpose of a sowing machine is to plant seeds in rows at the depth that has been set, while also ensuring that there is sufficient space between each individual seed. In order to charge a 12V battery that is used by DC motors, the eliminator is utilized. The distance that separates two seeds has been determined, and it is possible to manipulate this distance by adjusting either the size of the wheel or the number of teeth on the sprocket. This one-of-a-kind seed sowing machine innovation improves the efficiency of the planting process, hence lowering the amount of time spent on labor and saving money. By regulating seed depth and optimizing seed utilization, this equipment helps to reduce the amount of seed that is wasted.

The process of planting seeds is referred to as "sowing." It is possible to say that something or a place has been "sown" when seeds have been put there. Oats, wheat, and rye are among the most important field crops that are grown. Additionally, grasses and legumes are planted, while maize and soybeans are in the process of being planted. In the process of planting, wider rows (often 75 centimeters or more) are used with the intention of obtaining exact and consistent spacing between individual seeds inside the row. Several technologies have been created in order to disperse individual seeds at precise intervals.

The current invention pertains to a device for the planting of granular substances, namely for solid toxins and seeds. The primary employment of the Indian pastoral communities is husbandry, with both men and women participating in the process to varying degrees. It must sustain around 17% of the global population within 2.3% of the world's land area and 4.2% of the world's freshwater resources. The current cropping intensity of 137 has seen an increment of just 26 during 1950-51. The net sown area is 142 million hectares. The fundamental objective of the sowing process is to place the seed and poison in designated rows at certain depths and intervals, cover the seeds with soil, and provide adequate compaction over the seeds. A conventional method of seed planting has many drawbacks. The agriculture sector has always served as the foundation of India's enduring development. As India's population expands, the need for agricultural production concurrently increases. Consequently, there is a

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less need for repeated cropping in the fields, which in turn necessitates efficient and time-saving machinery. In handmade sowing, achieving equal seed dispersion is not feasible. In the present age, most nations lack a sufficient workforce in the agricultural industry. Consequently, we have invented the semi-automatic seed feeding vehicle, which encompasses all agricultural circumstances, including ploughing and seed distribution at specified intervals, controlled by a simple chain mechanism and equipped with a furrow closure. This vehicle is comparable to a tractor, although differs in cost and capability; it is accessible to all producers at a lower price point. This approach mitigates the mortality issues associated with colonization and conserves time. This machine will produce an optimal colony with less complications. In India, 70 people rely on agriculture. Seed has been a crucial agricultural item since the first crop was cultivated by prehistoric humans.

The seed colony is automatically created using a DC motor. It is also feasible to grow several types of seeds at varying distances. Consequently, it is essential to construct the husbandry machine appropriately and to pick the components that align with the crop needs. Therefore, it is essential to build a machine that can assist the planter in minimizing effort while planting. This process of using machines is termed robotization. In addition to automation, robotization enhances the efficiency of the process. Here is the block representation of the machine and its operation. It also addresses the execution of the strategy, the selection of variables, and the regulators involved. This system is essentially a four-wheeled robotic platform equipped with a seed tank, sowing medium, and metering equipment, transforming it into an automatically controlled vehicle. This composition delineates an advanced system for optimizing agricultural processes akin to those of civilization on cultivated land, predicated on robotic support. The machine will grow the ranch by taking into account certain columns at predetermined distances based on the crop kind.

SEED SOWING MECHANISM: The cells are configured so that the angle between each cell is 15 degrees, with the seeds positioned 10 cm apart. However, near each essential cell, seeds are positioned every 20 cm, and near two essential cells, seeds are positioned every 30 cm, should there be a need to modify the distance between one factory and another. This channel is the only medium via which all types of seed-to-seed civilization may function and operate under diverse seed distance specifications. Cell termination may be achieved utilizing any basic video or poultice.

LITERATURE REVIEW

Mahesh R. Pundkar and A. K. Mahalle give a review that offers concise information on the numerous developments in seed sowing machines available for planting. The seed sowing machine is an essential element of agricultural practices. The efficacy of seed sowing apparatus significantly impacts the expenses and output of agricultural goods. Currently, several methods exist to assess the efficacy of seed-sowing devices. Laukik P. Raut et al. examined the need of agricultural modernization to satisfy the food demands of the expanding population and fast industrialization. Mechanization facilitates input conservation by assuring precise metering, which enhances distribution, minimizes the amount required for optimal response, and prevents losses or wasting of applied inputs. Mechanization reduces the unit manufacturing cost by enhancing productivity and conserving inputs.

D. Ramesh and H. P. Girish Kumar published a review that offers concise information on the many sorts of advancements in seed sowing equipment. The primary aim of the sowing operation is to place seeds in rows at the specified depth and spacing, cover them with soil, and provide enough compaction over the seeds. The optimal row spacing, seeding rate, inter-seed spacing, and seed planting depth varied by crop and agro-climatic conditions to get maximum yields. Seed sowing apparatuses provide a significant function in the agricultural sector. Pranil V. Sawalakhe et al. have explored that the contemporary period is advancing towards the quick expansion of all sectors, including agriculture. To satisfy future food requirements, farmers must adopt innovative approaches that preserve soil texture while enhancing total crop yield. This paper examines the several sowing techniques used in India for seed sowing and positioning.

METHODOLOGY

Study of different Research papers

Framing of project setup (Line diagram of the

⇩

Dimensioning of frame, Specification of the Component for setting up a conceptual model

⇩

Assembling Of different components on main frame

⇩

Results & discussion about the error in the

RESEARCH METHODOLOGY

The design and fabrication of an autonomous seed sowing machine using IoT necessitates a synthesis of engineering, programming, and data analysis. To investigate this subject, you may adhere to the below methodology:

1. Define the Objectives: Explicitly define the aims of your study. Identify the particular elements of the autonomous seed sowing machine and its integration with IoT that you want to emphasize. This may include the design and construction of the apparatus, integration of IoT sensors, communication protocols, data processing, and more.
2. Review of Literature: Perform an exhaustive examination of current literature, research articles, patents, and other sources to get an in-depth comprehension of cutting-edge technologies, existing automated seed sowing machinery, and IoT applications in agriculture. This can help you discover the gaps in knowledge and the possible areas for development.
3. Conceptual Design: Utilizing the literature analysis, construct a conceptual design for the automated seed sowing apparatus. Evaluate elements like seed handling mechanisms, seed storage, soil sensing, communication protocols, power supply, and integration with IoT devices. Record the design specs and functional requirements.
4. Component Selection: Determine the necessary components and sensors for the automated seed sowing apparatus. Assess the several market possibilities according to factors like cost, dependability, accuracy, compatibility with IoT systems, and integration simplicity. Justify your option based on the project needs.
5. Prototype Development: Build a functioning prototype of the automated seed sowing machine based on the conceptual design. Compile the chosen components, fabricate the mechanical elements, and include the IoT sensors and communication modules. Guarantee optimal performance and verify the design.
6. IoT Integration: Establish the IoT framework for the automated seed sowing apparatus. Set up the IoT devices, establish wireless connection, and create the necessary software for data collecting, storage, and analysis. Establish appropriate communication methods and data visualization methodologies.

EXPERIMENTAL VALIDATION

A literature survey was undertaken at the project's earliest stage. The insights acquired from the literature review facilitated the development of a viable action plan with suitable dates. Quotations for essential components and a cost estimate for fabrication were used to build an estimated budget for the overall project.

PROBLEM STATEMENT

We are inspired to undertake this project due to its agricultural focus, as it allows us to address the machinery costs, which will be reduced by implementing a communal seed storage facility inside the machine. The removal will render the design straightforward and facile to manufacture. The dimensions of the machinery, manufacturing expenses, and transportation costs will all be reduced. Automation will be included in the process, hence reducing the need for operators.

SCOPE OF WORK

A seed sowing machine is a device that facilitates the precise placement of seeds, hence aiding farmers in conserving time and resources. In light of these considerations about spraying and seed sowing, an effort is made to design and build equipment capable of executing both processes more efficiently and cost-effectively. Reduce

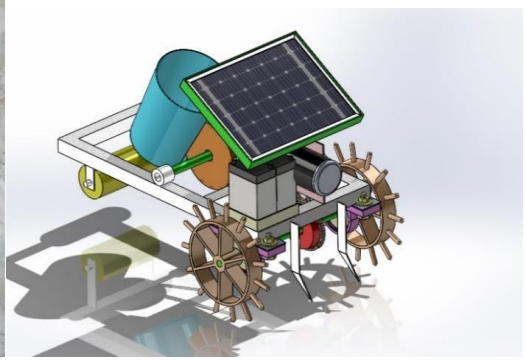
operating expenses by implementing a new system. Demonstrate consistent reliability throughout varying operating situations. Reduce the expense of the apparatus. Reduce labor expenses by enhancing the spraying technique. The equipment is operable on modest agricultural area (1 acre).

SYSTEM DESIGN & COMPONENT

In our endeavor to create a specialized machine, we have used a meticulous method; the whole design process has been segmented into two primary components. System architecture Mechanical design System design primarily addresses numerous physical constraints, ergonomics, spatial needs, the arrangement of components on the machine's primary frame, the number and positioning of controls, ease of maintenance, potential for future enhancements, and the machine's weight relative to the ground.

MECHANISM AND DESIGN

The entire model has been designed with the help of designing software solid works.



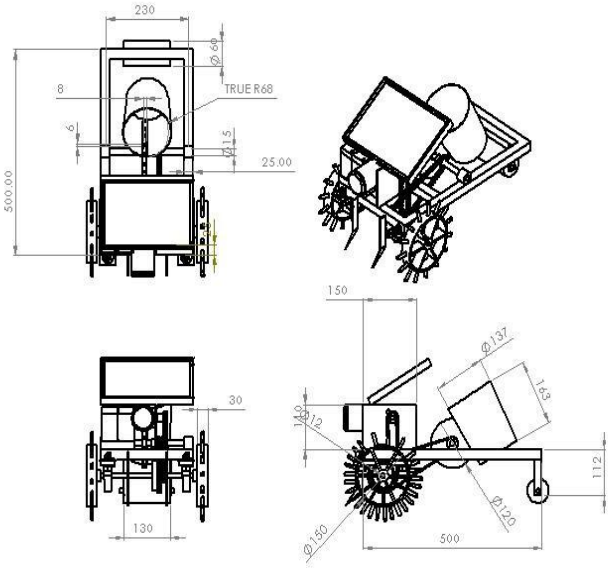


Table 1 Specifications of the seed sowing machine

Length	610 mm
Width	356 mm
Height	254 mm
Power transmission	Belt and Pulley
Hopper limit	1 kg medium size seeds
Number of distributer rollers	2
Distribution Mechanism	Fluted roller
Distributer driver	Rear wheel

CONCLUSION

During each full turn of the revolving wheel, seeds are dispensed from the seed drum, facilitating a seamless seed planting operation without any seed waste. The sowing disk rotates inside the seed chamber, allowing seeds to descend from the seed storage tank into the chamber. The seed buckets are gathering seeds from the chamber and sowing them into the ground at the requisite depth using a plow. The waste of seeds is being significantly minimized. This system has been designed for the automated planting of seeds. With the assistance of a robot, the seeds are dispersed into the soil in an orderly manner, therefore minimizing seed loss. The onion crop planting operation has been executed solely by the autonomous Seed Sowing V robot. This robot will assist farmers in executing the agricultural operation effectively. The idea may be expanded to include several types of crops, such as fruits, rice, and sugarcane. The robot may be constructed using a spiked nail wheel in lieu of a conventional wheel. Consequently, it may be used to the real-time agriculture sector.

FUTURE SCOPE

The created robotic vehicle exemplifies comprehensive agricultural automation. Nevertheless, given the extensive scope of agriculture, more enhancements may be included in this project to render it more intelligent and multifunctional.

This vehicle may be equipped with additional sensors, including soil pH sensors and temperature and humidity sensors, which are crucial aspects in agriculture. The vehicle may be equipped with a system for weed removal, allowing it to serve both sowing and soil preparation functions.

Furthermore, the use of rainfall sensors might facilitate the detection and quantification of irrigation requirements for crops, complementing the moisture sensor. Consequently, the platform developed in our project enhances the project's versatility by accommodating other applications for the vehicle and allows for future research opportunities.

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