FABRICATION OF SOLAR POWERED MINI ROTAVATOR

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Abstract -The "Solar Powered Mini Rotavator" project aims to create a compact, energy-efficient, and eco-friendly Rotavator to address small-scale farmers' challenges like high fuel costs, pollution, and manual labor. The project will replace the traditional engine with an Solar Powered motor, eliminating fossil fuel usage. The Rotavator will be lightweight and maneuverable, suitable for small farms and gardens. The project involves designing, developing, and testing the Rotavator for energy efficiency, tilling effectiveness, and usability. The anticipated result is a cost-effective, energy-efficient, user-friendly Rotavator prototype that could transform small-scale farming by reducing costs, environmental impact, and enhancing productivity.

Keywords : battery ,solar panel, blade, DC Motor

1. INTRODUCTION

The project is centered around the innovation of an Solar Powered mini Rotavator, a transformation tool in the agricultural sector. This tool is compact, making it ideal for use in smaller agricultural plots where larger machinery may not be feasible.

The Solar Powered mini Rotavator is a type of rotary tiller, a motorized cultivator that works the soil using rotating blades or disks. This mechanism allows for efficient and thorough tilling of the soil, preparing it for planting. Traditional rotary tillers are powered by gasoline or diesel engines, which can be noisy, polluting, and costly to maintain.

In contrast, the Solar Powered mini Rotavator is powered by an Solar Powered motor. This design choice offers several significant advantages. Firstly, it results in lower emissions, contributing to environmental sustainability. Secondly, Solar Powered motors tend to produce less noise than their internal combustion counterparts, leading to a more pleasant working environment. Thirdly, Solar Powered motors require less maintenance, reducing the time and money spent on upkeep. Lastly, the operating costs associated with Solar Powered motors are generally lower, as Solar Power is often cheaper than gasoline or diesel.

The project involves several stages. The design stage will determine the specifications of the Solar Powered mini Rotavator, taking into account factors such as power requirements, size, weight, and maneuverability. The development stage will see these designs brought to life, with the construction of a Rotavator prototype. Finally, the testing stage will evaluate the prototype's performance. This will involve a series of tests and simulations to assess energy efficiency, tilling effectiveness, and ease of use.

1.1 NEED OF THE PROJECT

mini Rotavator are a boon for farmers, especially those with small to medium-sized plots. They efficiently break and mix soil, enhancing soil structure and water infiltration, which leads to increased crop yields. These machines are cost-effective due to their lower fuel consumption, reduced maintenance needs, and time-saving capabilities. Environmentally friendly, Solar Powered mini Rotavator produce fewer emissions than traditional engines. Their compact and lightweight design makes them easy to maneuver and versatile for various tasks such as soil breaking, land leveling, and seedbed preparation. By adopting Solar Powered mini Rotavator, farmers can boost productivity, cut costs, and foster sustainable agriculture.

1.2 Solar Powered MINI ROTAVATOR

An Solar Powered mini Rotavator is a compact, lightweight cultivator powered by an Solar Powered motor. It's ideal for small to medium-sized plots, performing tasks like soil breaking and leveling. Unlike traditional Rotavator, it produces less noise, requires less maintenance, and has lower operating costs. It uses lithium batteries, offering about 6 hours of plowing per charge, making it a sustainable tool for modern agriculture

2. AIMS & OBJECTIVES

Aim : The aim of Solar Powered mini Rotavator is to facilitate efficient soil preparation and cultivation.

1. To replace then non-renewable energy sources with renewable energy sources.

2. To make farming more effective and easier.

3. It helps to breaking the soil into smaller particles and enhance the soil cultivation.

3.METHODOLOGY

The methodology of Solar Powered mini Rotavator includes several steps and process during this project like solar panel are used to charge the battery that powers the motor that is connected to pulley, pulley is attached to shaft ,on shaft l-shaped blade is fixed.

3.1 Selection of Materials

The Solar Powered mini Rotavator is a machine that helps in farming. It's like a small tractor that is powered by a battery. This machine has a controller that tells the motor how fast or slow to go. The motor then moves the pulley, which starts the weeding process.

The main structure is usually made of strong and light metals. The motor and pulley are also made of metals like steel and aluminum. The blade, which is the part that touches the soil, is made of a very strong type of steel. And lastly, the battery that powers the machine is usually a rechargeable type, like a lithium-ion battery.

4. COMPONENTS

4.1 DC Motor

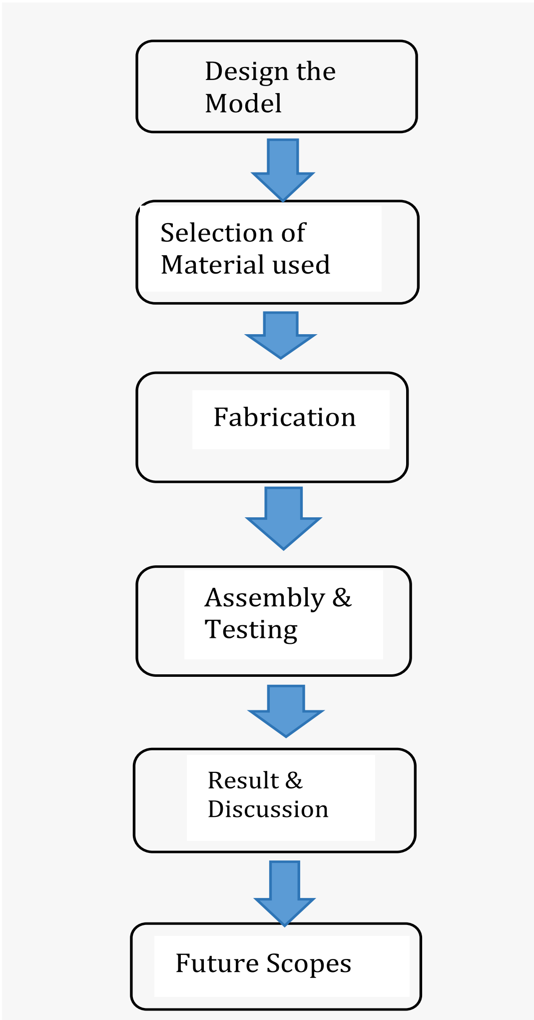

Fig 4.1 DC Motor

Output Power: 500W , Rated Voltage: 24V
Rated Speed: 2000 rpm

4.2 Battery

Fig 4.2 Battery

Battery Capacity: 80 Ah , rated Voltage: 24V

4.3 Shaft

Fig 4.3 Shaft

Length: 16inch, Diameter: 25mm

4.4 Bearing

Fig 4.4 Bearing

Type: P203

4.5 Solar Panel

Fig 4.5 Solar Panel

Power: 75W , Voltage: 17V

4.6 Belt

Fig 4.6 V-Belt

Type: B53 , Length: 53inch

4.7 Blade

Fig 4.7 L-Shaped Rotary Blade

Type: L-Shaped blade width: 5mm

4.8 Wheel

Fig: 4.8 Wheel

Diameter: 16inch, spokes: 16

4.9 Iron Angle Frame

Fig 4.9 Frame

Material: Iron

5. BLOCK DIAGRAM

Block diagram is analyze and imagine the actual model shape and size of Solar Powered mini Rotavator.

Diagram help us to create a project with correct specifications and dimension.

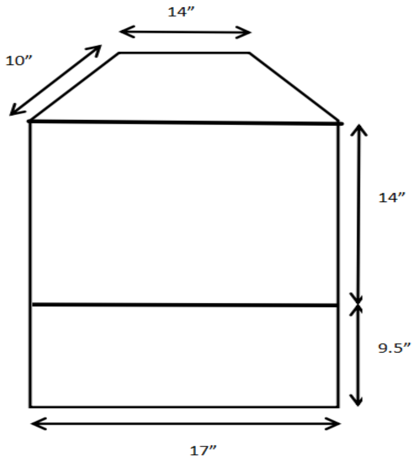

Fig: 5.1 Top View

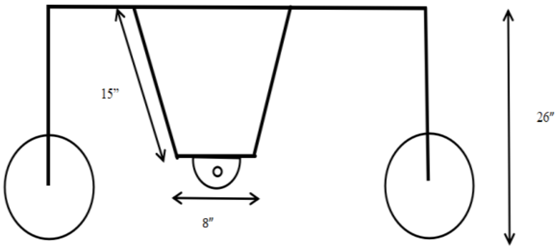

Fig 5.2 Side View

6. WORKING AND MODIFICATION

The Solar Powered mini Rotavator with the help of our group members we decide to make a mini Solar Powered poverty lock for which we create a blow diagram and circuit diagrams First on the computer follow the construction design after if we can decide the capacity of the load carried by the mini Solar Powered power dealer and the required force for the motor to rotor for using the soil and the required power to start the motor In this process we can select the type of material for structure of education work.

We design its skeleton first and define its size. First of all the selection of compliment as per the rating is difficult. At the initial stage we identify the torque required for the cultivation of land we select a high torque motor under suitable controller for that motor. For the connection Stop the wire with the battery with the motor at the time of motor selection we compare the hub motor with the BLDC Motor.How to get home In which we know that our motor has high losses as we require torque continuously but the half motor has a presidency to decrease torque as speed increases so we can avoid it the main issue with that help is that the Motors Foundation does not fit properly in high structure as for high torque and higher efficiency we select the BLDC motor as well as suitable and weight.For proper connection we crimp properly, And for proper handling and maintaining acceleration the throttle and lever are fitted To the handle in the fabrication work we will the main skeleton of the power Rotavator with the help of iron bars, angles and square tubes. In which we assemble the component like the controller, motor, battery, transmission, throttle etc The skeleton are on the cheese of the Solar Powered power Rotavator and do the connection of it. After the completion of the assembly we get to test it on the field. To begin fitting the rotary shaft to the gearbox we ground the motor shaft to the proper diameter for the rotation of the gearbox of connect shaft and motor wheel with the help of a chain.

In this many Solar Powered Power Rotavator, we connect the blade to the main shaft of the cultivator with the help of 1/4 inch pin for avoiding getting stuck in mud, we provide the metal strip ring at the both end of the rotatory. On the backside of the mini Solar Powered power Rotavator. we provide the iron strip support for proper standing of the power Rotavator and a joint front wheel For a smooth operation and locomotion. For the connection purpose first of all we measure the current value with the help of the multi-meter required for starting the motor and select the wire of 4square for a proper look as well as for protection of Solar Powered connection From water we make a cover of thin metal sheet and fix it on a skeleton.

Fig 6.1 Fabrication

7. FABRICATION

The fabrication of the Solar Powered mini Rotavator was a journey that began with a trip to the bustling Lat-us market, where the team carefully selected high-quality components for the Rotavator. Back in the department, they embarked on the design and assembly process, ensuring each component was precisely positioned and securely fastened. This phase required a deep understanding of mechanical principles and attention to detail. A significant challenge was balancing the model. Initial attempts led to instability, but the team persevered, brainstorming and experimenting until they achieved a balanced model, a major milestone that enhanced the Rotavator operational efficiency. The process was not without hurdles, including a shortage of essential tools and equipment in the department, leading to frequent market trips and workflow interruptions. However, each challenge was a learning opportunity, teaching the team resourcefulness and adaptability. The project's successful completion was a testament to the team's perseverance and problem-solving skills. They worked together, supporting each other through setbacks, and the experience of overcoming obstacles as a team was as valuable as the technical skills they honed. The fabrication of the Solar Powered mini Rotavator was more than just a final year project; it was a journey of learning and growth. The team built a functional model and developed practical skills and a hands-on approach to problem-solving. This project is a shining example of what can be achieved through determination, teamwork, and a practical approach to learning. The experience and knowledge gained will undoubtedly serve them well in their future endeavors as mechanical engineers.

7.1. ADVANTAGES

1. Solar powered no fuel needed.
2. It is solar powered that help farmers in such cases where Solar Powered is not available for 24 hour.
3. Easy to portable to anywhere.
4. Minimum maintenance is required.
5. Cheap in cost.
6. Eco-Friendly
7. Easy to operate and work.
8. Low running cost.

7.2. DISADVANTAGES

1. In winter solar will not work efficiently, then we have to charge the battery with electricity.
2. It is useful for small gardens and land.

7.3. APPLICATIONS

1. Crop cutting
2. Weeding
3. Soil preparation
4. For softening of land
5. For plough

8. CONLUSIONS

In conclusion, the solar-powered mini Rotavator represents a significant step forward in sustainable farming technology. As we are all aware, fossil fuels are not only becoming increasingly expensive but are also rapidly depleting. This escalating cost and scarcity of fuel have a direct impact on the operational costs of traditional farming equipment. By harnessing the power of the sun, a renewable and virtually inexhaustible source of energy, the solar-powered mini Rotavator offers a cost-effective and environmentally friendly alternative. This innovative machine not only reduces the dependency on fossil fuels but also significantly cuts down the operational costs, making it an economically viable option for farmers. Moreover, it contributes to the global efforts towards reducing carbon emissions and combating climate change. Therefore, the adoption of solar energy in powering farming equipment like the mini Rotavator is not just a necessity but a responsibility towards creating a sustainable future for farming and our planet.

9. FUTURE SCOPES

1. It can be make fully automatic by adding sensors and controller.
2. By increasing the numbers of motor it can be more efficiently.
3. Various process can be added further like spraying of pesticides and harvesting.
4. Number of blades can be increase to fine the smallest particles and soil enhancement.

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BIOGRAPHIES

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