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Agriculture Machine

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Abstract: An automated mobile platform is being developed to support specific agricultural tasks using a compact tractor. Spraying is the task under consideration, but the platform that is created should be universal. Precise control over the tractor, loader mechanism, and tractor-mounted task implement is essential. Development of the automated mobile platform can be broken down into various components, namely, the crawler, seed container and sprayer.By using this type of agriculture machine, we can save the time of farming by remote control operated tractor. By remote control we give the command to machine to perform respective operation of agriculture like crawling, seeding and spraying. As per required level of channels we can deep the crawler inside the land and at the same time by using seed container to crawler with the help of pipe ways we can directly deep the seed inside the land.

I. INTRODUCTION

The advancement of precision farming technology has led to a reevaluation of crop care mechanization. With the introduction of several concepts—many of which were not novel—it caused a paradigm shift in the way variability was thought of and managed. For the first time since mechanization was first employed, the spatial scale of variability could be effectively assessed and treated thanks to yield mapping and variable rate treatments (VRTs). From then on, we have witnessed a reduction in the management and treatment scale from farm to field to sub-field, with differing benefits and expectations.
This technological trend has persisted to the point where we currently have a large number of smart controllers that enable the treatment scale to be further lowered, all the way down to the plant and leaf.

II. LITERATURE SURVEY

1) *"Sahil Kirtane, Ansh Notani, Ali Dalvi, Sumit Waghmare, Prathamesh Kasar, "Multipurpose Agriculture Machine," Journal of Emerging Technologies and Innovative Research (JETIR)" March 2024, Volume 11, Issue 3 www.jetir.org(ISSN-2349-5162)."*

In this Research paper they have been discuss about the Multipurpose Agricultural Machine is used to ploughing the agricultural field and sow the seeds into the land for making lots of plant production in field. The model is proposed with the objective of establishing a ploughing, seeding and spraying processing. It is a mechanical device, in which the spraying machine is used to spray the water and chemicals to protect the plant. It also increases planting Efficiency and accuracy made from raw materials so it is much cheaper and more suitable for small-scale farmers. The advantage of this method, it reduces seeding and spraying time in land and reduces human effort.

2) *"Dilip Radkar, Goraksh Choughule, Abhijeet Desai ,Prathamesh Gawand , Pradip Bade,Yogesh Chaudhari , "Multipurpose Agriculture Machine," International Research Journal of Engineering and Technology (IRJET), e-ISSN: 2395-0056 Volume: 08 Issue: 05 | May 2021 www.irjet.net p-ISSN: 2395-0072."*

In this research paper author has use various agricultural equipment's and labors for caring out these steps, our purpose is to combine all the individual tools to provide farmers with multipurpose equipment which implements all the scientific farming techniques and specifications, suitable for all type of seed to seed cultivation with minimum cost as possible. All this can be done in this same machine. This multipurpose agro machine is designed and fabricated as multipurpose equipment which is used for agricultural processes like ploughing, sowing seeds and sprinkling water.

3) *"Shivam Rai, Navneet Rai, Deepesh Yadav, "Multipurpose agriculture machine",International Journal of Creative Research Thoughts (IJCRT)", 2021 IJCRT | Volume 9, Issue 7 July 2021 | ISSN: 2320-2882".*

In this Research paper they have been discuss about the Village artisanship in black-Smith carpentry and stone contributed to the development of Farm tools, such as counterpoises and earthenware for irrigating crops.

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Farming is the backbone of the Indian economy, requiring field work and spraying for a pest protection multipurpose agriculture equipment (MAE) was developed to improve the labor productivity and quality of a work to improve the efficiency, information Technology can utilize to develop a intelligent machine reduce energy Input and target energy more effectively. This new concept offers opportunity to develop a new range and agricultural equipment

4) *"Ashwin Chandran ,k. Varun Krishnan,T.V Arjun ,Vignesh, Nitin Joshwa " design and Fabrication of multipurpose farming equipment " International Journal of research in engineering,Science & Management (2020)."*

In this research paper author has mentioned the four plans for Design and development. The Multipurpose machine is used to sowing the seeds and fertilizer spray into land and grass cutting for making lots of plant production in agricultural field. It is a mechanical device here no electrical or other power source is not required. The cost of this machine is very low and easy to operate simple in construction

5) *"Pratikkumar V. Patel, Mukesh Ahuja, "Research And Design Of Multipurpose Agriculture Equipment" ,International Research Journal of Modernization in Engineering Technology and Science. (2020)."*

Electric vehicles offer many advantages ranging from easy access and abundance of electrical energy sources. The objective of this paper is to obtain the best configuration of the hybrid power systems for charging station in a rural area such as Labuan bajo, Indonesia. Thus, the best configuration obtained is then installing with three types of energy storage namely Lead Acid and UNS Lithium battery such as Lithium Ion and Lithium Ferro Phosphate (LFP) to determine the minimum cost of operation and energy cost in a year. The results showed by implementing hybrid systems from PV and DER is the best configuration for off grid charging station. The most optimal battery in off grid system achieved by installing UNS LFP batteries. As a conclusion, by utilizing hybrid power generation technology, the potential for renewable energy in rural areas can be the main key in realizing the availability of charging stations in rural areas with affordable price for supporting agriculture machine infrastructure.

III. INTRODUCTION TO WORK-STUDY

A. *Work-study*

1) The current system has agricultural machinery that is solar-powered available for use. Right now, research is being conducted. Numerous variables are considered when designing an agricultural machine, including installation location, module tilt angle, ambient temperature, shading, and natural cooling of the modules.
2) A farm machine's efficiency is directly determined by its solar modules.

The width of the heavy-duty tractor used for tasks like heavy cultivation, plowing, harrowing, seeding, etc. was three meters. for both traditional and ecological tillage. In contrast, a tractor's width of 2.6 meters was used for cultivation and plowing in conventional and conservation villages.

B. *Importance of Work Study in Industries*

The main purpose of this task is to design, develop, and make a special farm machine exclusively for the essential services of seed sowing, ploughing,. The desired machine should have a ploughing mechanism for effective soil preparation, a seed tank with a controlled release system to ensure uniform seeding and a water sprinkling component that will optimize seed germination. In focusing only on these fundamental aspects, the project tries to provide an automated solution to farmers hence increasing efficiency while minimizing human intervention in terms of manual labor during ploughing, seed sowing or water application in agricultural field..

C. *Need for Work-Study*

1) It is a direct means of improving the system's productivity involving very little or no cost.
2) No factor affecting the efficiency of operation is overlooked in this approach.
3) It provides the most accurate means of setting standards of performance which are helpful in the process of production planning and control.
4) Application of work-study result in immediate savings.
5) It is a universal tool for management
6) It is the most competent tool of investigation available to the management of the industrial unit.

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IV. METHODOLOGY

To create the Multipurpose Agriculture Machine by following detailed plans and guidelines. This enables it to meet the increasing needs of modern farming. This machine starts working as soon as its motor turns on. It proceeds, carrying out tasks.

1) *Using a Plough:* The primary goal of farming with a robust ploughing tool in a Multipurpose Agricultural Machine is soil cultivation. Mounted on an agricultural machine, it is used to break and turn soil to create a good seedbed for planting.
2) *Seed Sowing Tank:* The machine is equipped with a seed sowing tank, which is a crucial part of precise and effective planting. A round vessel is used to store seeds. Following plowing, the process of seed sowing begins, with tiny holes on the tank releasing seeds.

A. *Data Collection*

The data gathering is done by recording a video multiple time because we have to do the time study for the existing process and then for the calculation of standard time estimation same method is used for the improved process and its calculation of standard time estimation.

B. *Flow Process Chart and Sample Process Chart*

Analysis of Data

1) After collecting the data for the existing process and improved process, the data analysis was done.
2) The data analysis was done through brainstorming activity and recording a video in which the element description is gathered for the making of the U bag.
3) After that, the feasible activities to ignore or can be minimized are listed out to minimise the time.
4) The total time of the existing flow process chart and improved flow process chart was calculated separately, and the number of activities was also calculated separately.
5) Then the total time saved was calculated because of minimizing or ignoring some activities in the existing flow process chart.
6) Then time study was done for both the existing process and the improved process, and also, the standard time estimation was done for both the methods.
7) Problems were identified, and accordingly, an action plan was developed.

V. MODELING AND ANALYSIS

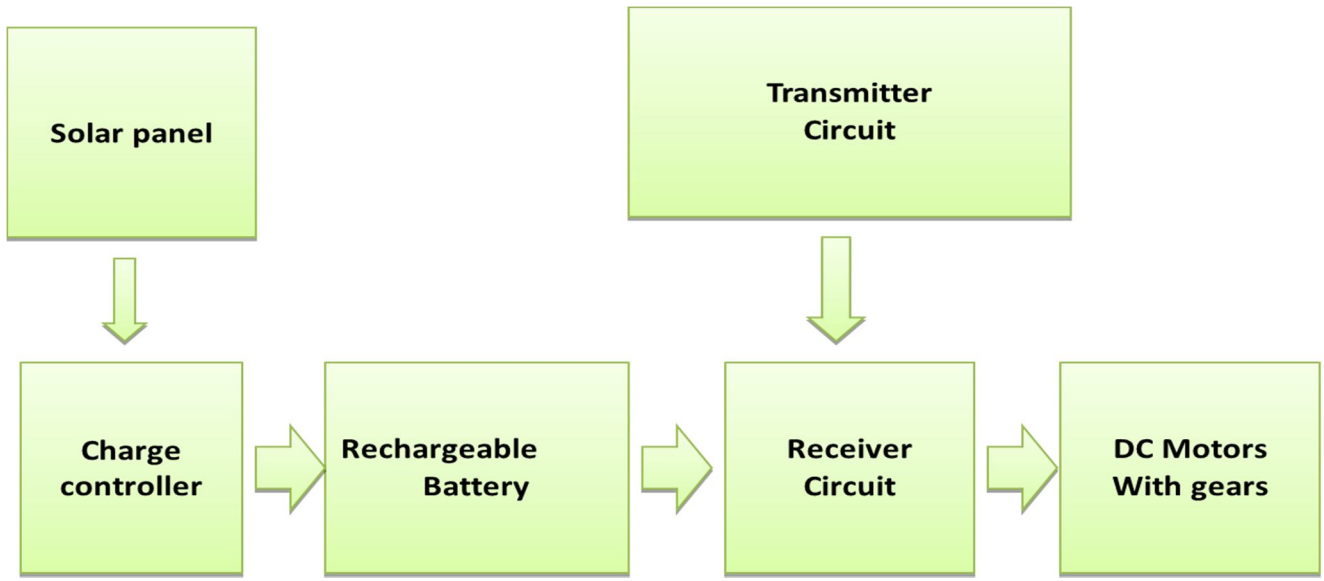


Figure 1: System representing Agriculture Machine

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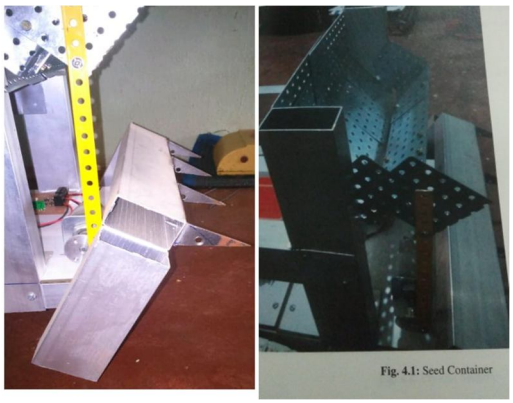


Figure 2: Model of Proposed Agriculture Machine

VI. RESULTS AND DISCUSSIONS

Based on the thorough evaluation of the performance of the multipurpose agriculture machine, it can be confidently concluded that this demonstration is well-suited to meet the diverse needs of small-scale farmers. Considerations the financial constraints experienced by these farmers, who cannot access viable solutions, this machine offers a promising solution.

Comparison between traditional m/c efficiency of cultivation digging

Mini – Power required = 13 HP

Fuel required = 5.5 lit

Area covered = 4046.8 m2..... [11]

Design project m/ c efficiency of cultivation design

Power used = 13HP

Fuel required = 4 lit.

Area covered 4346 m2 .....[11]

Relative Efficiency :-Traditional m/c = Area/ fuel required

= 4046.8/4.5

= 899.28 m2/lit

Project m/c = Area / fuel required

= 4046.8/4

= 1086.5 m2/lit

Relative efficiency = (P.M – Tm) *100

= (1086- 899.28 / 1086) * 100

Relative efficiency = 17 % more than traditional m/c

A. Discussion

1) Multipurpose operation can be performed on a single machine.
2) Machine should be easy to operate.
3) Cost of the equipment should be as low as possible. (That can be affordable to every farmer)
4) Multiple operations to be done on this machine so as to reduce time and efforts.
5) This machine has one-time investment.
6) This Machine should have less maintenance cost
7) This machine should be use in intercrops.
8) Machine should be digging the space in farm which traditional can not reach.
9) Trample the area should be minimum

VII. CONCLUSION

After the designing and analysis of the “Agricultural Machine" conclusion which we made are as follows:

Based on the overall performance of themachine we can definitely say that the project will satisfy the need of small scale farmer, because they are not able to purchase costly agricultural equipment.

The machine required less man power and less time compared to traditional methods, so if we manufacture it on a large scale its cost gets significantly reduce and we hope this will satisfy the partial thrust of Indian agriculture.So in this way we solve the labour problem that is the need of today's farming in India.

Unique machine designed to carry out the task of spraying the fertilizers and sowing of seeds is developed.The complete calculations along with the software model are presented in this paper. It overcomes the problem associated with conventional spray such as back pain due to weight carried on back on person.

This is a handy machine which will be helpful to improve the performance during farming operations.The device is made such that can be easily operated in field. The vehicle power is provided by two stroke petrol engine, and controls are given at handles. The steering mechanism is easier to operate and simple. Equipment controls are handy and easily accessible. The control switch is provided for spraying operations. Thus, this fabrication is value for money..

Solar panel can be installed for running the machine with the help of solar power that will be stored in the battery attached to it.

VIII. FUTURE SCOPE

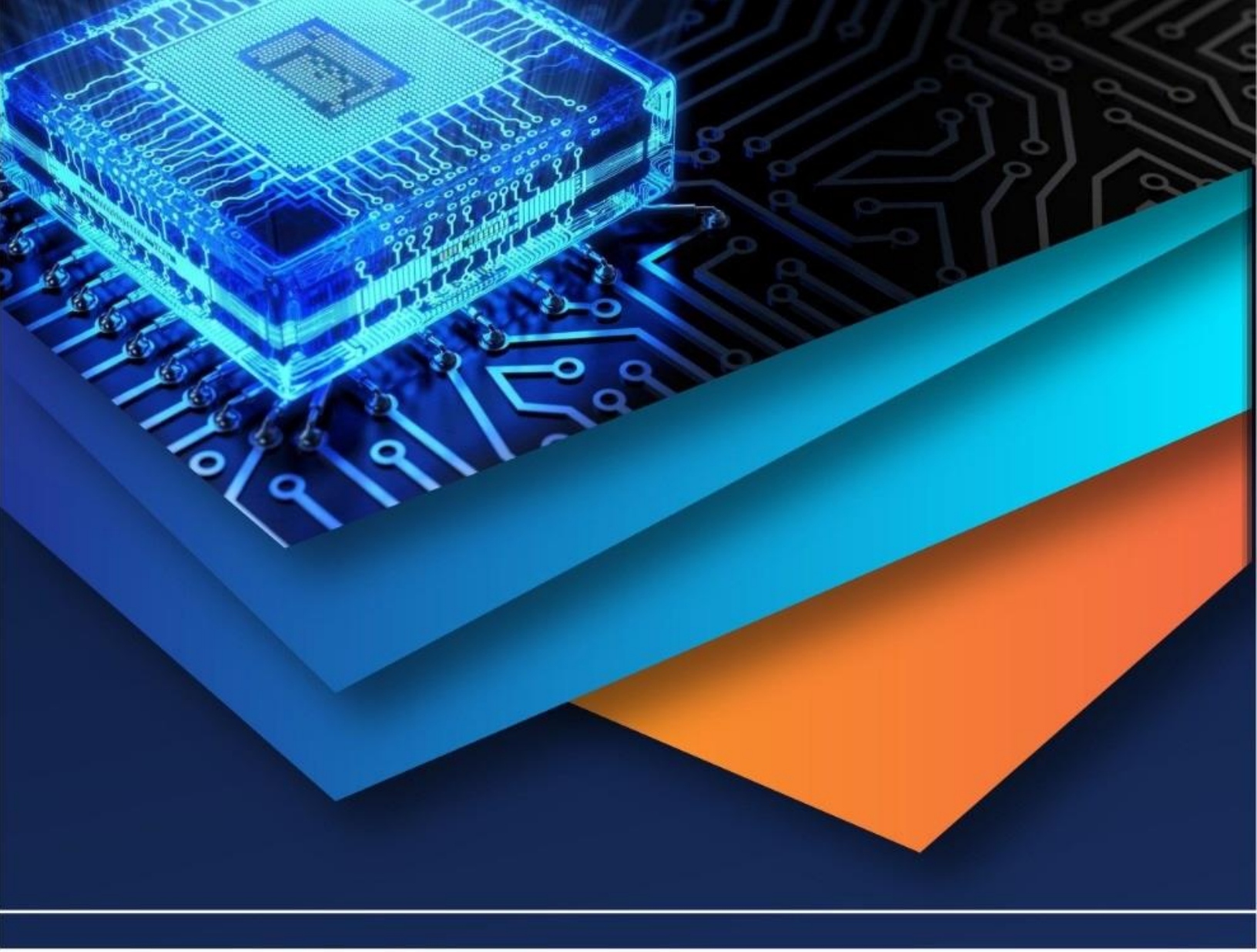
Agriculture is humankind's oldest and still its most important economic activity, providing the food, feed, fiber, and fuel necessary for our survival.

With the global population expected to reach 9 billion by 2050, agricultural production must double if it is to meet the increasing demands for food and bio energy. Given limited land, water and labor resources, it is estimated that the efficiency of agricultural productivity must increase by 25% to meet that goal, while limiting the growing pressure that agriculture puts on the environment.

1) In the multipurpose farming machine in place of petrol engine, the diesel engine and other gasoline engine can be used for improving performance and the environmental friendly.
2) In multipurpose machine in addition to ploughing and seed sowing, the arrangement for fertilizer and manure can be made.
3) In this machine instead of sowing in two rows it may be increased further.
4) In our machine farmer is walking with machine during seed sowing and ploughing, providing seating arrangement into the machine will be beneficial.
5) Using pure Oxygen for the fuel cell instead of air can improve fuel cell efficiency which can be extracted from the electrolyser if included.
6) Improving model accuracy with regard the effect of ambient temperature and wind speed and install temperature sensor and wind speed meter.
7) S-Savonius turbine will replace by S-Spiral type turbine for better performance, output and efficiency at low speed and torque.
8) One axis rotational mechanism can change into two axis rotational mechanism for the rotation of PV module in east to west faces.
9) One can use the Microcontroller or Microprocessor base MPPT (Maximum power point tracking) system to improve the efficiency of PV panel.

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