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Agriculture equipment 3 in 1: CASE STUDY

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Abstract

We are developing agriculture three in a new RND mechanical project. This project provides farmers with three needs solution cropping, spraying, dust ring. Short explanation of each We part as follows.

Agriculture Duster We have developed an agriculture duster of a new RND mechanical project. It is a common type of duster being used by farmers. The duster consists of a hopper, fan/blower, rigid/flexible discharge pipe, reduction gearbox, rotating shaft to connect motor, and metering mechanism. The duster has a mechanical agitator connected to the gearbox placed in the motor, which chums the chemical and prevents clogging of the outlet. The adjustable orifice plate mounted below the hopper outlet controls the application rate. For operation, the hopper is filled 1/2 to 3/4th of the capacity of the hopper. This is mounted on the framework with the help of adjustable straps. The discharge pipe fitted with spoon type deflector is directed towards the target continuously rotating the switch on motor. The chemical in dust/powder form drops from the hopper in the discharge pipe having an air stream created by the blower. These dust particles emerging in the forms of cloud from the discharge pipe are carried to the plant where these settle on the leaves, stems and other parts. –are developing agriculture three in a new RND mechanical project. This project provides farmers with three needs solution cropping, spraying, dust ring. Short explanation of each We part as follows.

i. Introduction

In this age of Industrialization, Robotic Agriculture (agricultural environments serviced by smart machines) is developed to meet the need of fast shrinking human assist machinery. For agricultural applications, driverless tractors have been developed by many researchers in the past, but they lack in abilities to handle real world complexities therefore most of the engineers relied on industrial and mechanical way of farming, Where machines could work entirely in predefined ways as everything was programmed in system much like a manufacture line. Modern agriculture uses a lot of energy. It comes in many forms from fertilizers and chemicals to tractors and fuel. The Phytotechnology approach tries to target the introduced energy to improve efficacy. Chamen (1995) identified that a 72% energy saving can be made in cultivation energy by moving from traditional trafficked systems (256 MJ/ha) to a non-trafficked system (79 MJ/ha). This was for shallow ploughing and did not include any deep loosening. From this we forecast that 80-90% of the energy going into conventional method is there to repair the damage done by large tractors. It would be much better to not cause compaction in the beginning which is one of the reasons that leads us to consider using small light machines. Various drawbacks of using huge machines made farmers

to rely on small handy machines which are not only cheap but also occupy less space comparatively. Traditional or macro spraying can be very efficient, especially when they cover large areas. Most equipment manufacturers are developing larger machines, with 42m booms currently under development. Variable rate, patch spraying, minimizing skips and overlaps could all be built into the original design specifications by controlling individual nozzles. Conventional or traditional techniques depend on human power for lifting, dragging, weed control and fruit picking. Humans are forced to work in risky environment while spraying chemicals and pesticides on the crops for bug contrrol The tractors compress the soil, as they are heavier in weight. They cannot move in terrain environment. But using small machines which can be moved in the farm to perform spraying and dusting we can spray the fertilizers everywhere in the farm. In the case of automated or mechanized agriculture which uses agricultural robot is exemplified from above problems. Robots can work impatiently in all conditions; all you must do is put a program to execute the desired actions. Although, huge sized wheels are necessary in muddy soils, robots having small sized wheels perform well. The lightweight of the robots is a main advantage, since they do not compress the soil as larger machinery does. Robot will stroll on fields to take care for crops for their appropriate growth. Three different mechanisms which are useful to farmer, and they need these mechanisms in daily routine work though it be any crop. For the farmers convenience we developed this Three mechanisms in one system which is compact, less expensive, solar powered and comfortable to us

ii. **Working**:

Components –

- Cutting System
- Spraying System
- Dusting System

1) Cutting System: - A grass cutter is a powered garden or agricultural tool used to trim small plants, small crops and other foliage. Various blades or heads can be attached to the machine for specific applications. Grass cutters have different intended uses and come in many types and sizes, but they all have roughly the same use: to keep the grass trimmed. Whatever your grass-cutting needs, a tool stands ready to help you do it. Choosing the right grass cutter for the task makes the work easier and leads to satisfying results. The cutting machine is attached to the motor, when the supply is given to motor, motor start running due to which the cutting machine starts. The grass is trapped in the cutting blades because of this the grass is being cut.
2) Spraying System: - Spraying system is used to spray fertilizers over the farm. As some fertilizers may harm humans the spray nozzle is kept away from the user. A spray nozzle is a precision device that facilitates dispersion of liquid into a spray. Nozzles are used for three purposes: to distribute a liquid over an area, to increase liquid surface area, and create impact force on a solid surface. Centrifugal pump working on solar energy pumps the fluid from tank and sprays uniformly over the plant.
3) Dusting System: - Hand Rotary Duster is widely used in the agriculture sector due to its high performance, reliability, sturdy construction, less maintenance, corrosion resistance and longer service life. It is available in different capacities at market leading prices as per the needs of the clients. For control of pests and diseases by use of chemicals in the dust forms in nursery, vegetable gardens, field crops, tea and coffee plantations, green houses. The

duster consists of a hopper, fan/blower, rigid/flexible discharge pipe. The duster has mechanical agitator

iii. Design of project

Figure 1 : Agriculture in 3 in 1 system

iv. Conclusion

This knowledge of the project will be helpful in our future. So, we must maintain that this final year's project was an essential part of our engineering education, enhancing our technical knowledge and practical skills. Our aim was to lift the maximum weight in minimum power consumption as to reduce the solar panel and motor cost. Hence, we are provided with our aim by designing a suitable gear box to get maximum mechanical advantages. Due to gear boxes the maximum torque required to lift the load is not coming directly on the motor shaft as we had seen it in the gear box design .so at the end shaft the speed is reduced which we are required & sufficient torque is increased to lift the load. Hence the motor is revolving with min. load over its shaft with minimum solar capacity.

Reference –

1) Chandana R, "A Multipurpose Agricultural Robot for Automatic Ploughing, Seeding and Plant Health Monitoring", International Journal pf Engineering Research & Technology (IJERT) ISSN:2278-0181 Volume 8, Issue 11, IETE – 2020 Conference Proceedings
2) Gowtham Kumar S N,"Multipurpose Agricultural Robot", International Research Journal of Engineering and Technology (IRJET) p-ISSN: 2395-0072 Volume: 06 Issue: 04 Apr 2019
3) Ranjitha B,"Solar Powered Autonomous Multipurpose Agricultural Robot Using Bluetooth/Android App", IEEE Xplore ISBN: 978-1-7281-0167-5, 2019 IEEE
4) Vishnu Prakash K, , "DESIGN AND FABRICATION OF MULTIPURPOSE AGRICULTURAL ROBOT", International Journal of Advanced Science and Engineering Research, ISSN: 2455-9288 Volume: 1, Issue: 1, June 2016
5) Charan Singh A. Patil "Survey on Multifunctional Robotic Vehicle for Agriculture Application" BEST: International Journal of Management, Information Technology and Engineering (BEST: IJMITE) ISSN 2348-0513 Vol. 3, Issue 6, Jun 2015, 35 38 © BEST Journals.
6) Ankit Singh,"Agribot: An Agriculture Robot" International Journal of Advanced Research in Computer and Communication Engineering Vol. 4, Issue 1, January 2015
7) Miss. Shwetal Raut , "A Review on Agricultural Robots", International Journal of Advanced Research in Computer Engineering & Technology (IJARCET) Volume 4 Issue 7, July 2015.