

# Agriculture Three in One Mechanism System

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**ABSTRACT:** This research paper is about agricultural system used to perform various agricultural tasks using various technologies to automate the tasks of farmer. Agriculture is main source of livelihood in India and is considered as backbone of Indian economy. There are various machines, equipment used by a farmer but being costly not every farmer uses them. We have chosen solar energy as source to drive the whole mechanism, to reduce the cost and to reduce the pollution. The three types of farming needs can be controlled by using this machine which is cheap and eco-friendly. The ultimate goal is to provide farmers the cheaper and advanced option to meet the needs of farming.

**KEYWORDS:** Cutting System, Spraying System, Dusting System, Solar Panel, Control Panel, Motors.

## 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 force to work in risky environment while spraying chemicals and pesticides on the crops for bug control. 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 have to 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 use.

## II. PROBLEM STATEMENT

We are applying the idea of robotics in agriculture. In agriculture, the opportunities for robot-enhanced productivity are immense and the robots are appearing on farms in various guises and in increasing numbers. As today's era is of technology, using technology in agriculture may lead to better production to farmer. We can expect the robots performing agriculture operations autonomously such as spraying and mechanical weed control, fruit picking, watching the farms day and night for an effective report. Agri-bot is a robot designed for agricultural purposes. It is designed to minimize the labor of farmers in addition to increasing the speed and accuracy of the work. It performs the elementary functions involved in farming i.e. harvesting, spraying, seeding and removing the weeds. And they gradually appear advantages in agricultural production to increase productivity, improve application accuracy and enhance handling safety, but they are costly and may not compatible with real world problems. The most common difficulties observed in farming are the cost of equipment's like dusting machine, cutting machine, and spraying machine. The convectional equipment's used, requires the fuel for their working, this increases the maintenance of the

equipment. Automation saves a lot of tedious manual work and speeds up the production processes. Now-a-days we have lack of man power. So our machine will automate the tasks by saving money, power and will use solar energy to perform three tasks in a single frame to be useful for farmer.

Objectives -

1. Cost Effective.
2. To use solar energy.
3. To be more compact.
4. Easy to operate.
5. To reduce Fuel cost
6. To reduce Pollution.

Scope - Agriculture robot is a robot designed for agricultural purposes. As one of the trends of development on automation and intelligence of agricultural machinery in the 21st century, all kinds of agricultural robots have been researched and developed to implement a number of agricultural productions in many countries. This Robot can perform basic elementary functions like picking, harvesting, weeding, pruning, planting, grafting

## III. WORKING

### 1) Components –

- Cutting System
- Spraying System
- Dusting System

#### i. Cutting System :-

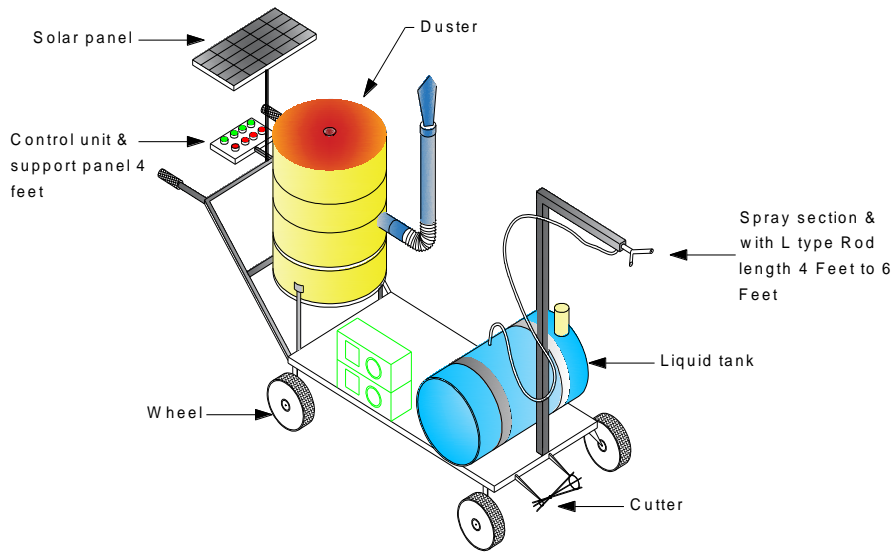
A grass cutter is a powered garden or agricultural tool used to trim small plants, small crops and other foliage. Various blades or heads can be attached to the machine for specific applications. Grass cutters have different intended uses and come in many types and sizes, but they all have roughly the 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.

#### ii. 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.

#### iii. 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



**SCHEMATIC DIAGRAM OF MULTIPURPOSE PROJECT**

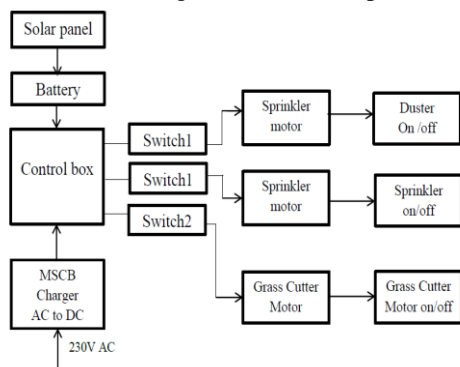
**2) Hardware Requirements :-**

**i. Solar Panel :-**

Solar Panel is used as a power source to drive various components of the system. The solar panel used in this project is a product of CNBM International Corporation. It is a photovoltaic module.

**ii. Control Panel :-**

Control Panel is used to control the various motors. Farmer can operate various operations through control panel.



**iii. Grass Cutter Motor:-**

DC motor shaft connected to sharp blade (grass cutter) .when switched on motor switched that time motor start and cutting work started that time push the overall system.

**iv. Sprinkler Motor :-**

A sprinkler is a device used to irrigate agricultural crops, lawns, landscapes, golf courses, and other areas. They are also used for cooling and for the control of airborne dust.

**v. DC Motor:-**

A DC motor is a mechanically commutated electric motor powered from direct current (DC). The stator is stationary in space by definition and therefore the current in the rotor is switched by the commutator to also be stationary in space. This is how the relative angle between the stator and rotor magnetic flux is maintained near 90 degrees, which generates the maximum torque.

**vi. SPST Switch:-**

SPST Switch – Single Pole, Single Throw Switch is used to disconnect or connect the conducting path in an electrical circuit.

**vii. Battery 12V:-**

An automotive SLI battery (starting, lighting, and ignition) powers the starter motor, the lights, and the ignition system of a vehicle's engine.

### Literature Review:

The literature review has been referred from journals, reports, conferences and books. Some research papers were also referred to have information on the previous art of research. Thus, this chapter tries to discover previous studies and expedite it for the current study in this thesis.

1. **“A Multipurpose Agricultural Robot for Automatic Ploughing , Seeding and Plant Health Monitoring” - Chandana R, Nisha M, Pavithra B, Sumana Suresh, Nagashree R N:** The robot for agricultural purpose is an autonomous robot which is controlled remotely through a wireless Bluetooth connectivity between the Smartphone and the robot. The Bluetooth electronics app is used to control each and every operation of the robot. The Bluetooth HC-05 module is fixed on to the robot which receives signals from the Bluetooth electronics app and sends these signals to the microcontroller For processing of operations. The microcontroller is powered by a 12V DC battery and it consists of a voltage regulator, which is used to regulate the voltage input for the controller.
2. **“Multipurpose Agricultural Robot” - Gowtham kumar S N, Anand G Warriar, Chirag B Shetty, Gerard Elston Shawn D'souza:** The multipurpose agricultural robot gives an advance method to sow, plow and cut the crops with minimum man power and labor making it an efficient vehicle. The machine will cultivate the farm by considering particular rows and specific column at fixed distance depending on crop. Robots can improve the quality of our lives and enhance opportunities for future mankind to create an upgraded model for the betterment of farmers. In agriculture, the opportunities for robot-enhanced productivity are immense and the robots are appearing on farms in various guises and in increasing numbers.
3. **“Solar Powered Autonomous Multipurpose Agricultural Robot Using Bluetooth/Android App” - Ranjitha B, Nikhitha M N, Aruna K, Afreen:** The designed robot will perform the seed sowing, pesticide spraying and grass cutting operations simultaneously. When the solar panel gets heated it converts sunlight into electricity. This electrical energy is fed into the charging circuit. The charging circuit will work according to maximum power point tracking (MPPT) protocol to generate pulsed voltage and also avoids reverse current.
4. **“Agribot: An Agriculture Robot”- Ankit Singh, Abhishek Gupta, Akash Bhosale, Sumeet Poddar:** The main feature of the Robot is the Ability to find the grass in the field using Image processing. For this we are using a special purpose Web cam which will take photos inside the field and if the grass is found then he will inform the robot to cut the grass in the crop field and also he will pick the grass which has been cut by the robot. We will also use image processing for analyzing the height of the plant. If the height of the crop is larger than the reference height then the cutting mechanism will be used by the robot to cut the crop.
5. **“A Review on Agricultural Robots”- Miss. Shwetal Ramesh Gund, Prof. V. P. Bhope:** In this paper brief review is being done about the different types of robots which increase the exactness and precision of the agriculture. Experiments are being made on recently anticipated world's smallest, lightweight robot for using them as scouts in farm fields. In emergent countries, like India and Brazil, farmers are attracted in using robots to raise fields of crops, pick fruit, or even for animal husbandry. Currently, agriculture robots must contain human dealings in order to compensate for programming difficulty issues.

## FUTURE SCOPE

This Smart system can be further enhanced by using a Web scraper which will help the Smart system to work according to the weather forecast, if heavy rain is forecasted then less water is supplied to the plants and many more attachments can be done to make farming smart and efficient.

## CONCLUSION

This project has set out a vision of how aspects of crop production could be automated one. Although existing manned operations can be efficient over large areas there is a potential for reducing the scale of treatments with autonomous machines that may result in even higher efficiencies. The development process may be incremental but the overall concept requires a paradigm shift in the way we think about mechanization for crop production that is based more on plant needs and novel ways of meeting them rather than modifying existing techniques.

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