

“ FABRICATION OF MULTICROP SPRAYING ROBOT”

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ABSTRACT

People in India use backpack type sprayer for spraying pesticides which is carry on back of the person with 15 lit maximum capacities and one nozzle in one hand while other hand is used to pump the machine to create pressure. But pesticides can cause short-term adverse health effects, called acute effects, as well as chronic adverse effects that can occur months or years after exposure. . Examples of acute health effects include stinging eyes, rashes, blisters, blindness, nausea, dizziness, diarrhea and death. Examples of known chronic effects are cancers, birth defects, reproductive harm, neurological and developmental toxicity, immunotoxicity, and disruption of the endocrine system. For example, infants and young children are known to be more susceptible than adults to the toxic effects of pesticides. Farm workers and pesticide applicators are also more vulnerable because they receive greater exposures.[1]

There are also such equipments in the market which solve this problem like machine which is consisting of water tank on tractor. This water tank contains liquid pesticides and many more which are costly enough that every farmer can't buy it. Also they are non eco-friendly as they are using fuel which emits hazardous gases cause damage to the environment

On looking all this problems we try to make such type of smart pesticide agriculture robot which is most needful for current farm sector. Project operates on solar energy. Which makes it eco-friendly which is most feasible advantage of this project? There is no much maintenance cost and no operating cost as it is using solar energy. It is free of cost and there is no pollution as its working principal is very simple and it is economical of the farmers which is one more advantage. It can also generate power that power is saved in the battery and it can be use to spray pesticides on the herbs and plants. Also it can spray in multi-directions with more than one nozzle which is time reducing. At last It will help in minimizing adverse effect on human being, will be economical, time reducing and eco-friendly.

KEY WORDS:- Solar Power, Robot, Spaying Machine, Pesticides, Eco-Friendly, DC motor, Nozzle, Battery, Remote control.

I. INTRODUCTION

Agriculture has been the back bone of Indian^[11] and Nepalese economy and culture and it will be continued to remain as such for a long time in future. Spraying of pesticides is an important task in agriculture for protecting the crops from pests. In Nepal and India, near 70% peoples are dependent upon agriculture^[9]. Agriculture is a profession of many tedious processes and practices, one of which is spraying of pesticides in the crops. Solar pesticide sprayer is a useful machine which is ergonomics, motion stable which is more efficient to workers, and the energy source used in non conventional. Hence it poses a great scope in future. Agriculture has a predominant role in our day to day life. Spraying of pesticides is an important task in agriculture for protecting the crops from pests. The conventional methods were a person carrying a sprayer and manually actuating a lever to generate and pump the pesticide through a tube or a mobile vehicle carrying an inbuilt compressor and

sprayer unit. Another major drawback in human operated systems is that the operator is exposed to the harmful chemicals while spraying which is extremely detrimental to operator's health. A solar powered semi automatic pesticide sprayer model consists of a solar panel, a battery, two DC motors, pump, container, microcontroller and device which is operated by a wireless remote(range of 30 to 50meters) which runs on power source as a DC battery(12V, 7.5Ah). The capacity of the container in the sprayer was designed with 5 litres capacity for an uninterrupted operation with the discharge rate of 0.556 l pm. Analysis of solar radiation data from Bangalore showed that the sprayer can be best operated during 9 AM to 5 PM. The vehicle is powered using an onboard solar powered battery which runs down the running cost. Besides reducing the cost of spraying, there is a saving on fuel as well. The farmers can do the spraying operation without human interference thus protecting them from noxious chemicals

Insects are largely responsible for the crop destruction. Insecticides or pesticides, a man made or natural preparation are used to kill insects or otherwise control their reproduction. These herbicides, pesticides, and fertilizers are applied to agricultural crops with the help of a special device known as a "Sprayer," sprayer provides optimum performance with minimum efforts. The invention of a sprayer, pesticides, fertilizers, bring revolution in the agriculture or horticulture sector especially by the invention of sprayers, enable farmers to obtain maximum agricultural output. They are used for garden spraying, weed and pest control, liquid fertilizing and plant leaf polishing. There are many advantage of using sprayers such as easy to operate, maintain and handle, it facilitates uniform spread of the chemicals, capable of throwing chemicals at the desired level, precision made nozzle tip for adjustable stream and capable of throwing foggy spray, light or heavy spray, depending on requirement. Agriculture sector is facing problems with capacity issues, shrinking revenues, and labour shortages and increasing consumer demands.

The sun is the most abundant and unlimited source of energy. As solar energy is one of the most important non-conventional sources of energy. This energy is environmental friendly, which is mainly free from pollution. Solar energy get from the sun is harvested on the solar panel the panel is made up of photovoltaic cells, which converts energy from photon to electric. And these cells are made up of silicon semiconductor. Solar panel is used to store electric energy or charge the battery from the solar energy. And the battery charged is used to operate DC pump for spraying the pesticides.

II. LITERATURE REVIEW:-

- Agricultural Robots in Targeted Spraying: A mini State-of-the-Art review George Adamides*
Agricultural Research Institute, Cyprus Submission: November 22, 2017; Published: February 06, 2018
*Corresponding author: George Adamides, Agricultural Research Institute, Cyprus,

-Abstract of this artical present the most resent contributions to the field of agriculture robotics,with a focus on robot sprayers

- International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering
.Agriculture Robotic Vehicles Based Pesticides Sprayer Kazi Khalid Abdul Karim1 , Mankari Hemant Tanaji , Bodhgire Yogesh Uttamrao, Momin Md. Arbi Md. Husain UG Student, Dept. of EE,
Annasaheb Chudaman Patil College of Engineering, Kharghar, Maharashtra, India

- Abstract of this project deals with the exposition of how robotics can be applied to various fields of agriculture. The project proposes a new strategy to replace humans in various agricultural operations like detection of presence of pests, spraying of pesticides, spraying of fertilizers, etc. there by providing safety to the farmers and precision agriculture

III. OBJECTIVE

- Implementation and use of the solar technology.
- Modified the existing technology.
- To make use of solar system were working sun rays is readily available.
- The objective of this paper is to present robotic model which is easily operates agriculture operation
- Now a days it is necessity of automation in agricultural field to reduce the farmers efforts & labor cost

- To perform operation like spraying hence increases production & saves time.
- For battery charging solar energy is to be used. The rays of the sun can be used for solar power generation.^[2]

IV. COMPONENT'S:-

1. **MILD STEEL CHASIS:-**Chassis is for to support frame, on which body mounts And wheels are attached to it.



Specification :-

Length:-30 inch
Width :- 20 inch

2. **Tank:-**Tank is used to store various liquids and pesticides



Specification :-

capacity :- 15 lit.
Quantity :- 1 unit

3. **Motor:-** Motor is used to generate the power to drive the wheels and robot.



Specification :-

Type :- L-type
Volt :- 12 V
Revolution :- 200 rpm
Quantity :- 2unit

4. **Solar Panel:-**Solar panels absorb the sunlight as a source of energy to generate electricity or heat.



Specification :-

Solar Panel Power :- 10 Watt
Size :- 1.17 feet × 1.05 feet
Quantity :- 1 unit

5. **CHARGE CONTROLLER:-** A solar **Charge Controller** is fundamentally a voltage or current controller to charge the battery and keep electric cells from overcharging.

**Specification :-**

Volt :- 12 V

current :- 6 Amp

Quantity :- 1 unit

6. **BATTERY:-** Battery is used to store electrical energy in the form of electrons.

**Specifications:-**

Volt:-12V

Current:-7Ah

Quantity:- 1 unit

7. **WHEELS:-** Wheels are used to give acceleration to robot and to move the robot to accomplish given work.

**Specification :-**

Diameter:- 16 inch

Quantity :- 4 unit

8. **BEARINGS:-** Pedestal bearing are widely used for providing support for a rotating shaft with the help of compatible **bearings** and various accessories. It is also known as **pillow block** (or) Plummer block. It is used for long shafts requiring intermediate support.

**Specification :-**

Model :- UCP204

Inner bore dia. :- 20mm

Quantity:- 4 unit

9. **BOOSTER PUMP:-** A **booster pump** is a machine which will increase the pressure of a fluid.

**Specification :-**

Voltage :- 12 V

Current :- 2.1A

Max Pressure :- 0.45 MPA

Max Flow :- 3.5 LPM (lit/min)

QUANTITY :- 1 unit

10. **Spraying nozzle:-** A spray nozzle is a precision device that facilitates dispersion of liquid into a spray.

**Specification :-**

Nozzle Dia. :- 0.039 inch = 1 mm

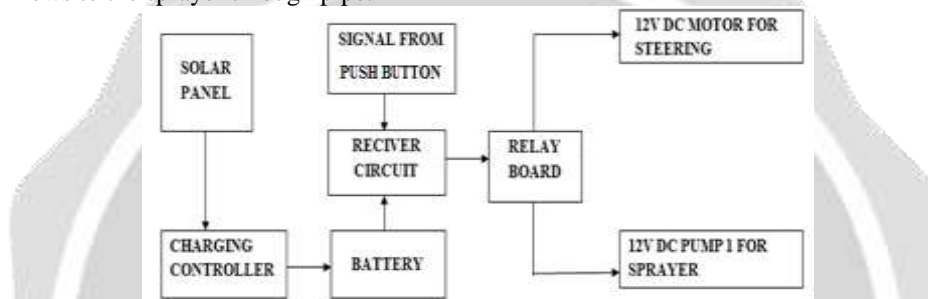
Area covered :- 8 - 10 feet

Quantity :- 2 unit

V. METHODOLOGY

Pesticide Operation is used in farm to sprayer the Pesticide to reduce the effect of insects and this process is also beneficial to human health.

- Pesticide is stored in the plastic box and the DC motor is connected with the plastic box and the pipe.
- The power for pump is regulated by a toggle switch.
- The water flows to the sprayer through pipe.



This project operates on solar energy. The concoction is accomplished by the use of solar panel, a centrifugal pump which runs on dc supply is attached to solar panel the solar panel generates the power that power is dc power positive and negative charges are connected to a batter in order to save the power, use it when the sun rays are not present by using this device we can spray pesticides to the herbs and plants and any agriculture spraying it is economical as compared to the other means used like petrol/diesel pesticides sprayers.

There is no much maintenance cost and no operating cost as it is using solar energy it is free of cost and there is no pollution its working principal is very simple and the it is economical of the farmers which has one more advantage that it can also generate power that power is saved in the battery and it can be used for both for spraying and well as to light in are not there that time we can charge the battery and use it to spray pesticides to the herbs and plants as compared to petrol/ diesel it is economical no efforts to human just he has to carry the device the device is light in weight so it is much feasible.

VI. FABRICATION:-

For the fabrication of multi-crop spraying robot the following various process is carried out.

- **Cutting:-** Cutting is compressive and shearing phenomenon, and occurs only when the total stress generated by the cutting implement exceeds the ultimate strength of material of the object being cut.
- **Welding:-** Welding is the fabrication process that joins materials, usually metals, by using high heat to melt the part together and allowing them to cool causing fusion.
- **Drilling:-** Drilling is the cutting process that uses a drill bit to cut a hole of circular cross-section in solid materials.
- **Grinding:-** Grinding is abrasive machining process that uses a grinding wheel as the cutting tool.

VII. CONCLUSION

In agriculture, by using the solar operated multi-purpose robot. We can easily reduce the farmer efforts and time. The machine required less man power and less time compared to traditional method. We hope this will satisfy the partial thrust of Indian agriculture. So in this way we can overcome the labour problem that is the need of today's farming in India. In future the robot also runs on PLC and SCADA with fully automation. [2]

This project demonstrates the implementation of robotics and mechatronics in the field of agriculture.. We are developing a robot whose construction is enough to withstand the challenges of the field. We are sure that once this concept is presented in a manner suitable to Indian market, it will definitely help in bringing down the 15% modality rate found in the Indian formers associated with the agricultural spraying operation.

VIII. REFERENCE

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