

Solar Powered Multipurpose Pesticide Remote Controlled Robot

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Abstract: The population of India is increasing rapidly in order to fulfill their diet and needs, the production of foods must be increased. But this must come at affordable to everyone. In India farming is done by traditional ways beside that there has been larger development of industry and service sector as compared to that of agriculture sector. To mechanization of agriculture in India some equipment has been developed. The pesticide sprayer is one among them and it is done by traditional farm workers by carrying backpack type sprayer, which requires human effort or by using electric pump. To improve the agriculture system and to reduce the human effort and problems associated with the backpack sprayer new equipment is fabricated which will be beneficial to farmers. The equipment utilizes renewable energy source (Solar energy) which is eco-friendly to function. The solar panel gives out electric supply to system, the radio controlled transmitter and receiver minimize drudgery of farmer. Also minimize the wastage of pesticide and time. Our contribution on our project is by using eco-friendly reliably available solar energy as a main source of energy making this multifunctional sprayer device by advancing the spraying methods which make friendly to use and operate which can be useable in different spraying stages of farming as per process requirement. It can be operated in small farming land with the standard spacing decreasing the labor cost and human effort.

Keywords: Solar, Robot, Pesticide, Remote

1. Introduction

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.

Renewable Energy is generally defined as energy that comes from long lasting resources. 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. The prevalence of traditional agriculture equipment intensifies these issues. In addition, most formers are desperately seeking different ways to improve the equipment quality while reducing the direct overhead costs (labour) and capital. Thus, a significant opportunity rests with understanding the impact of a pesticide sprayer in an agriculture field.

2. Methodology

The frame is designed to with stand all the loads of the robot. The other components are getting assembled on the frame by means of Bolt and Nut. The material used is CR-Mild steel bar and it is welded. The Project consist of following parts,

- Frame
- Wheel- 04 No.
- 48V Hub motor-01 No.
- 12V Wiper motor- 01 No.
- Battery
- Solar panel
- Circuit board and Controllers
- 12V DC Pump-02 No.
- Pesticide Tank- 16-liter Capacity
- Nozzle- 04 No.

3. Objective of the system

The objectives of the systems are given below

- Easy of construction.
- ECO friendly (Because we are using solar power and charged battery for operation)
- More economical.
- Easy to clean and maintain.
- Its works on renewable energy source called solar energy.
- It does not create air pollution & noise.
- Easy to handle.
- Does not require fuel for working hence operation is cost reduced.

- 1) There is no running cost associated with the sprayer.
- 2) The maintenance cost is only restricted to life of battery and PV (Photo Voltaic) module. No requirement of skilled operator. The sprayer is very economical in case of mass manufacture of the entire unit.
- 3) The flow rate calculation demonstrates the optimization of output flow rate of pesticide within time constrains which reduces the wastage of pesticide.
- 4) In case of unavailability of sunlight, the sprayer batteries can be charged by electric supply available at home. The need for handling long electric cable to operate the machine is eliminated which makes it portable to use.
- 5) The sprayer prevents biological hazards of spraying powder pesticide by means of conventional methods. Micronutrients can also be sprayed with the help of it.
- 6) The sprayer is highly economical and can be used on small land area to large.

4. Working Principle

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 the solar panel the solar panel generates the power that power is dc power its positive and negative charges are connected to a batter in order to save the power and use it when the sun rays are not present by using this device we can spray pest ices to the herbs and plants and any agriculture spraying it is economical as compared to the other means used like petrol/diesel pesticides sprayers.

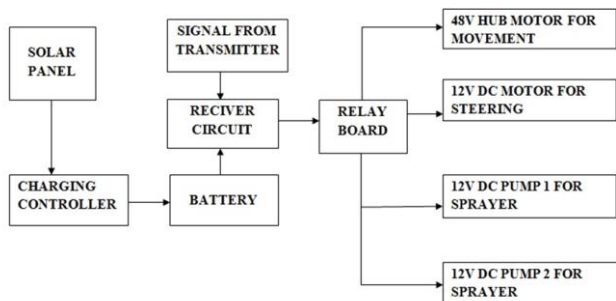


Fig. 1. Schematic diagram of the experimental setup

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. The schematic layout of the experimental setup is shown in Fig. 1.

The photographic view shown in Fig. 2 describes the experimental setups that are constructed for this study.

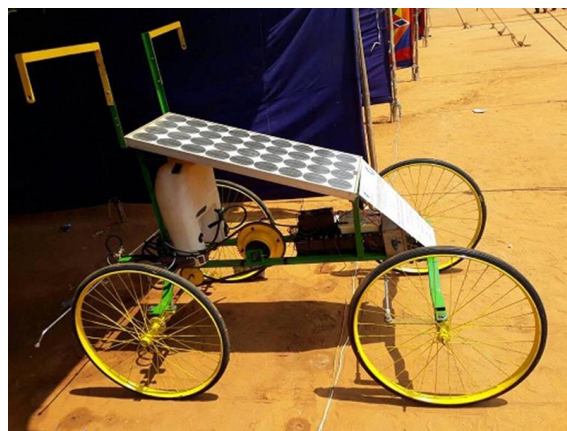


Fig. 2. The photographic view of the experimental setup

5. Results and discussions

Based on the experiment performance it is found that the solar panel used in the project provides 17 volt 0.58amp. The scarcity of power to run the machine can be overcome by this. On the other hand, the battery can also be rechargeable by supply available at home. The manual labor is eliminated by this module because we are using here remote controller, the constant and effective spray can be achieved easily which eventually increases the productivity.

- 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.
- There are no health hazards to the operator. The initial cost of the proposed system is little more but it can be balanced in by the running cost of the system which costs was very less. The developed system can be used for spraying the fertilizer, pesticides, and fungicides and also for ground surface watering like Cricket Ground.
- The arrangement of nozzles is adjustable according to the crops like horizontal as well as vertical.

6. Conclusion

The proposed system is very efficient and can be used in

agricultural field very effectively. This technology is most suitable for Energy Alternate Device for power sprayers. This system is user friendly and also environment friendly as it doesn't produce any pollution. Also this robot can be used at very remote place where fuel and power are not available. As this sprayer is economical than that of the conventional engine operated sprayers. Moreover, the same technique and

technology can also be extended for all types of power sprayers.

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