# DESIGN AND DEVELOPMENT OF REMOTE CONTROLLED SOLAR POWERED MULTIPURPOSE PESTICIDE SPRAYER AUTOMATED ROBOT

## PROJECT REFERENCE NO.: 40S_BE_1103

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## 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. Timely application of herbicides, pesticides and fungicides (collectively called *Crop Protection Products* - CPP) at peak periods plays a vital role in ensuring better yields from a crop. The magnitude of this problem is further amplified due to shortage of labor during this time. Hence, mechanization of application is the only viable option in this scenario. Correct Equipment selection for CPP application is the most important issue we need to address for effective pest and weed control.

**Different types of sprayer available are,**

- Knapsack Sprayers
  - Hydraulic
  - Manual pneumatic
- Motorized pneumatic
- Foot Sprayer/Pedal Pump Sprayers
- Traction Pneumatic Sprayer
- Tractor mounted sprayers
- Aerial sprayers

## Objectives:

- **ECO friendly** (Because we are using solar power and charged battery for operation)
- Easy of construction.
- 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.

## Methodology:

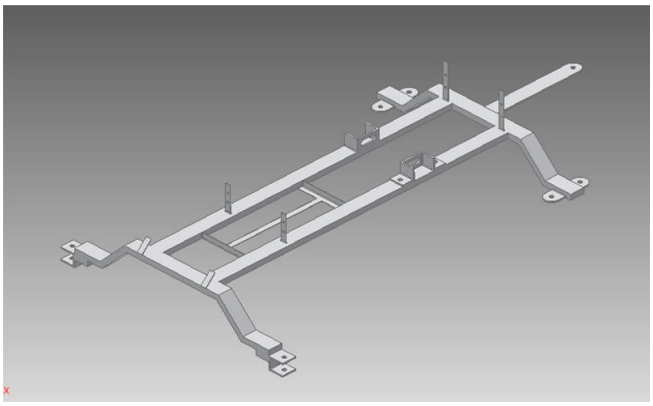

**Fig:** 3D CAD Model of frame

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.

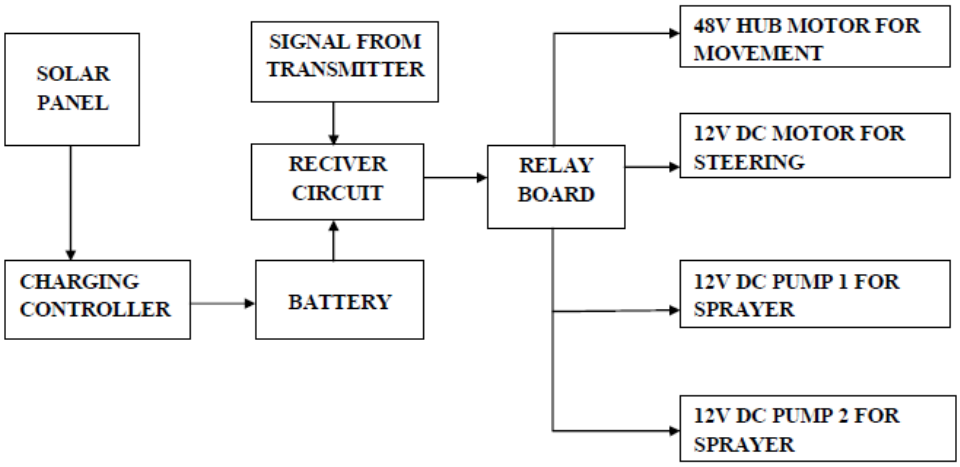


**Fig:** Block Diagram of our Pesticide Sprayer

In this project we had used solar panel for charging the battery, the main source of power is electric current, and it is stored in the battery. We have used Lead acid battery which will be sufficient to drive all the motor and pump. 48V hub motor for rear drive and for steering 12 wipers motor is used.

The robot is controlled with the help of RF-remote control, we used 6C transmitter and receiver and it is programmed with Arduino nano MC and connects to relay board. We had used 100psi pump for sprayer.

**Fig:** Final Project Assembly (Front View)

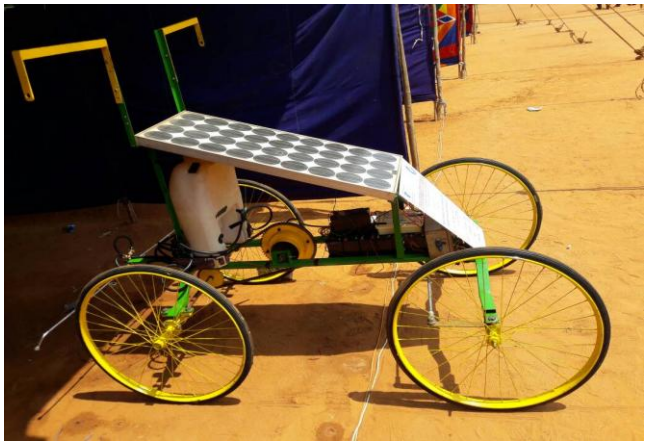

**Fig:** Final Project Assembly (Side View)

## Result and Conclusions:

- 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.

## Scope for future work:

- By adopting new Advanced Computer Technology we can make full automatic spray.
- Implementing the Telescopic Nozzle we can adjust the length of the spray required.
- Using the Hydraulics System to the wheel, helps in varying the ground clearance.