



Pesticide Spraying Robotic Arm using Solar Panel

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Abstract— In agriculture robots are deployed for agricultural purposes. The main use of robots in agriculture is for harvesting, Fruit picking, driverless tractor or sprayer are design to supersede human labor. Main aim is to avoid manual spraying of pesticides at actual farm. It will achieve by replacing human by a robot, through transmission of video of crop to central station. Then central station will control movements of the robot and spraying of the pesticides, using processor in real time. This will reduce the excessive use of pesticide for plant.

The practice of pest management by the rational application of pesticides is supremely multi-disciplinary, combining many aspects of biology and chemistry with:

- Agronomy engineering
- Meteorology
- Social-Economic and public health
- Newer disciplines such as Biotechnology and Information science.

Keywords- Robotic arm, DC Motor, Spraying gun.

I. INTRODUCTION

In this highly competitive running world, emphasis of knowledge is valuable and further implementing this knowledge into practical usage is an important factor which is done by an engineer. Hence we are trying do so. Pesticide application refers to the practical way in which pesticides, (including herbicides, fungicides, insecticides, or nematode control agents) are delivered to their biological targets (e.g. pest organism, crop or other plant).

Public concern about the use of pesticides has highlighted the need to make this process as efficient as possible, in order to minimize their release into the environment and human exposure (including operators, bystanders and consumers of produce).

II. COMPONENTS

For the designing and fabrication solar powered pesticide the following are the main components:

• Main components –

a) Pesticide container: Pesticide container should be used whose material is lighter to lift on the back of farmer for a long time. The best preferable material is plastic. This plastic container should be fixed with the help of belt.

b) Spraying gun: Spraying gun with type should be best preferred of stainless still which is highly supportive for the flow of pesticide.

c) DC Motor: DC motor is used to lift the pesticide from the tank and delivers to the spray gun.

d) Spraying nozzle: 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 solid surface. A wide variety of spray nozzle applications use a number of spray characteristics to describe the spray

e) Robotic arm: A robotic arm is a type of mechanical arm, usually programmable, with similar functions to a human arm; the arm may be the sum total of the mechanism or may be part of a more complex robot. The links of such a manipulator are connected by joints allowing either rotational motion or translational displacement. The links of the manipulator can be considered to form a kinematic chain. The terminus of the kinematic chain of the manipulator is called the end effectors and it is analogous to the human hand.

f) Solar panel: Solar panel refers to a panel designed to absorb the sun's rays as a source of energy for generating electricity or heating. A photovoltaic (PV) module is a packaged; connect assembly of typically 6×10 solar cells. Solar Photovoltaic panels constitute the solar array of a photovoltaic system that generates and supplies solar electricity in commercial and residential applications. Each module is rated by its DC output power under standard test conditions, and typically ranges from 100 to 365 watts. The efficiency of a module determines the area of a module given the same rated output – an 8% efficient 230 wattmodule will have twice the area of a 16% efficient 230 watt module. There are a few commercially available solar panels available that exceed 22% efficiency and reportedly also exceeding 24%. A single solar module can produce only a limited amount of power; most installations contain multiple modules. A photovoltaic system typically includes a panel or an array of solar modules, a solar inverter, and sometimes a battery and/or solar tracker and interconnection wiring.

g) Chassis: A chassis consists of an internal vehicle frame that supports a manmade object in its construction and use, can also provide protection for some internal parts. An example of a chassis is the under part of a motor vehicle, consisting of the frame (on which the body is mounted). If the running gear such as wheels and transmission, and sometimes even the driver's seat, are included, then the assembly is described as a rolling chassis.

III.ROBOTICS

A robot is a programmable machine which does certain tasks .we can be reprogrammed as per utilizer requisite. Fundamentally it is an electromechanical system.

Agricultural robotics: this technology uses sundry automation techniques in bio-systems such as agriculture, forestry and fisheries.

Different types of robots:

Autonomous robots: these robots work entirely under the control of computer program. Sundry sensors are habituated to amass the data about their circumventions.

Tele-controlled robots: these robots work under the guidance of either computer programs or humans.

Remote-controlled robots can be controlled by users with a controller such as joystick, TV remote or other hand-held contrivance.

Robots used in Agriculture field:

- Demeter (for harvesting): it is a robot utilized for cutting crops. It looks akin to a mundane harvester, but it drive itself without any human supervision.
- Weed controller: it does the task of weed abstracting..
- Forester Robot: it is a particular type of robot utilized for cutting up of wood..
- Fruit picking robot: The fruit picking robots need to pick ripe fruit without damaging the branches or leaves of the tree. The robots must be able to access all areas of the tree being harvested. The robot can distinguish between fruit and leaves by utilizing video image capturing.

IV.BLOCK DIAGRAM

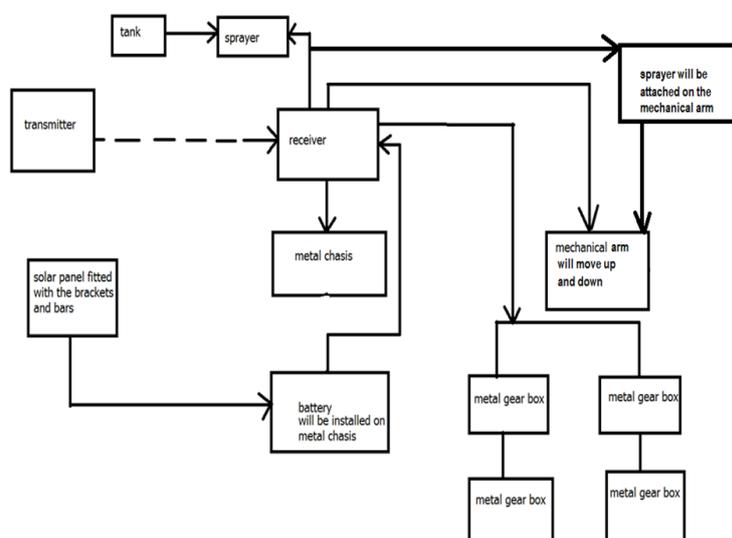


Fig: Block diagram of Pesticide Spray Robot

The battery will be charge from solar panel. The transmitter circuit will send the command and the receiver circuit will receive the command of forward reverse left right. The spraying function will also control from the controller circuit. The tank will supply the pesticide and the sprayer will be operated through the transmitter circuit. The mechanical arm will move upwards and downwards motion and the sprinkler pipe will be attached on the arm and the pesticide will be spread in all directions as the arm will move. The sprayer will be attached on the mechanical arm.

ADVANTAGES

- No manual work.
- The machine can be controlled easily.
- Effective spraying.
- Large quantity of pesticides liquid can be filled in the tank at one time so no need to fill the tank every time as in case of manual spraying.
- The spray can be done on heighted portion of trees having fruits or on the crops having low height.

- The machine will run on battery and the battery can be easily charged from solar energy.
- Labor cost will reduces.
- The machine will reduces.

V.CONCLUSION

- The basic aim of solar pesticide sprayer is to reduce the work of farmers which is done manually.
- Solar pesticide sprayer is proved to be useful machine which concentrates on ergonomics which is more efficient to workers, and the energy source used is non conventional.

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