

# Solar Based Automatic Pesticide Sprayer System

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**Abstract:** A robotics-based guidance method is presented to guide a robot platform which is designed independently to drive through the crops in a field according to the designed concept of open architecture. Thus, the robot platform is designed in real time to guide the platform on the basis of detection of crop using Ultrasonic sensor. The proposed system is basically developed to implement an agriculture production. This type of system is very useful in agriculture field where we need to spray the pesticide to different crops. This system automatically sense crop of both sides by using ultrasonic sensor.

**Keywords:** Solar Panel, Sprayer, Ultrasonic Sensor, Regulator, Arduino, Relay.

## INTRODUCTION

The Sector Of Agriculture is the backbone of Indian economy since, in India, near about 70% peoples are depends upon agriculture systems in India should be advanced to reduce the efforts of farmers. Agriculture is profession of many tedious processes and practices, one of which is spraying of insecticides in the farm. Sprayers are

mechanical devices that are specially designed to spray liquids quickly and easily. They come in different varieties .in this project we will take a look a solar operated mechanical sprayers. a sprayer of this type is great way to use solar energy. The pesticides have a vital influence of the agribusiness. Nearly 35% of crops have been safeguarded from the insects using pesticides. The pesticides are needed for agriculture field to increase the efficiency but they are also injurious to human and also to the environment. In the current methods, the farmers use the backpack sprayer which is manually operated by the human along the crop fields. They used to spray the pesticides in the targeted way manually. Here the sprayer is connected to the back of the tractor and this tractor was driven by the human. The pesticides were sprayed to the crops along the field. This method does not uses the selective spraying and the pesticides are spread to the field. In spite of the utilization of pesticide assurance gear (individual head veil and focal filtration framework for the manual and automated spraying strategies, separately) the human is as yet presented to unsafe pesticides that can cause negative medical problems.

## LITERATURE SURVEY

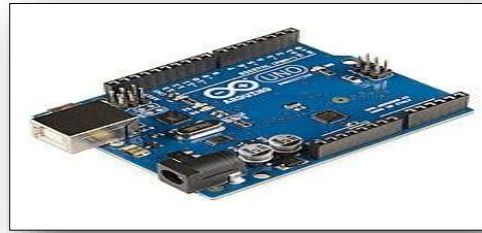
With flourishing technology that is introduced in this 21<sup>st</sup> century, there is numerous types of robots been used in agricultural activity starting from the cultivation process to the production process. The autonomous robot had been introduced in various application such is in underwater, rescue ,line following robot based on metal detection .in agriculture field, the usage of robotics in agriculture operation able to help to increase the production process and improve efficiency. One of the types of robot used in agriculture is for the purpose of pesticide spraying with the ability to navigate in the farm , recognize the target and regulate the spraying mechanism.

## WORKING

### HARDWARE COMPONENTS REQUIRED:-

#### Arduino-

**Arduino** is an open-source electronics platform based on easy-to-use hardware and software. Arduino boards are able to read inputs - light on a sensor, a finger on a button, or a Twitter message - and turn it into an output - activating a motor, turning on an LED, publishing something online. You can tell your board what to do by sending a set of instructions to the microcontroller on the board. To do so you use the Arduino programming language (based on Wiring), and the Arduino Software (IDE), based on Processing.-



**Fig. Arduino**

### Ultrasonic Sensor-

The Ultrasonic sensor uses SONAR to determine the distance of an object just like the bats do. It offers excellent non-contact range detection with high accuracy and stable readings in an easy-to-use package from 2 cm to 400 cm or 1" to 13 feet.

The operation is not affected by sunlight or black material, although acoustically, soft materials like cloth can be difficult to detect. It comes complete with ultrasonic transmitter and receiver module.

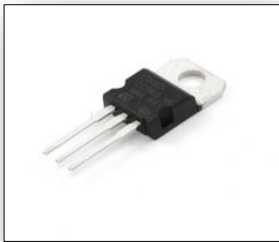


**Fig.  
Ultrasonic Sensor**

## Voltage regulator-

A voltage regulator is a system designed to automatically maintain a constant voltage. A voltage regulator may use a simple feed-forward design or may include negative feedback.

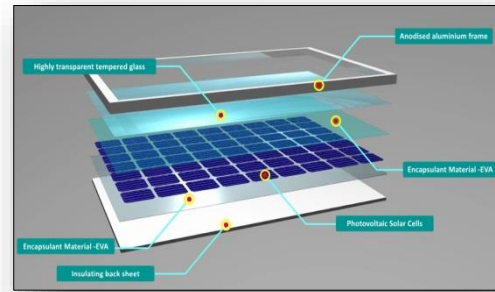
It may use an electromechanical mechanism, or electronic components. Depending on the design, it may be used to regulate one or more AC or DC voltages.



**Fig .Voltage Regulator**

## Solar plate-

A solar panel, or photo-voltaic (PV) module, is an assembly of photo- voltaic cells mounted in a framework for installation. Solar panels use sunlight as a source of energy and generate direct current electricity. A collection of PV modules is called a PV panel, and a system of panels is an array. Arrays of a photovoltaic system supply solar electricity to electrical equipment.

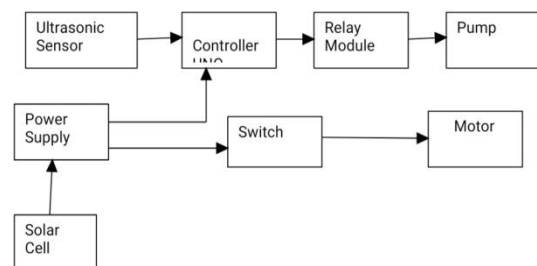


**Fig. Solar Plate**

## Sprayer-

A **sprayer** is a device used to spray a liquid, where sprayers are commonly used for projection of water, weed killers, crop performance materials, pest maintenance chemicals, as well as manufacturing and production line ingredients. In agriculture, a sprayer is a piece of equipment that is used to apply herbicides, pesticides, and fertilizers on agricultural crops.

## FLOW CHART



**Fig. Existing System**

### ACTUAL PROTOTYPE-



### CONCLUSION-

Aim of this project is to fulfill the tasks spraying chemicals on the plants using non convectional energy sources. As we know 70% of population of our country lives in villages and their main occupation is agriculture. Solar operated spray will help the farmers of those remote areas of our country where fuel is available easily. They can perform their regular work as well as save fuel.

### FUTURE SCOPE-

The future scope of a solar-based automatic pesticide sprayer system holds significant potential for several reasons. Here are some aspects to consider:

**1.Sustainable Agriculture:** As the demand for sustainable farming practices grows, solar-based solutions can contribute to reducing the environmental impact of pesticide application. Using solar power as

the energy source aligns with the goal of reducing reliance on fossil fuels and minimizing carbon emissions.

**2.Increased Efficiency:** Automation and precision in pesticide spraying can lead to more efficient and targeted application. Solar-based systems can integrate advanced technologies like sensors, artificial intelligence (AI), and machine learning to optimize pesticide usage and minimize wastage. These systems can detect pest populations, weather conditions, and crop health indicators to deliver the right amount of pesticide at the right time and in the right areas.

**3.Cost Savings:** Solar energy provides a cost-effective alternative to traditional fuel sources. By utilizing solar power, farmers can reduce their operational costs in the long term. Additionally, an automated system can optimize pesticide usage, reducing overall expenses associated with manual labor and pesticide purchases.

**4.Scalability and Adaptability:** Solar-based systems can be scalable to meet the needs of different farm sizes and crop types. They can be designed for individual farms or integrated into larger agricultural systems. These systems can also be adaptable to different geographical locations, enabling farmers worldwide to benefit from solar-powered pesticide spraying.

**5.Data-driven Decision Making:** Solar-based automatic pesticide sprayers can collect valuable data on crop health, pest patterns, and weather conditions. By analyzing this data, farmers can make informed decisions regarding pesticide application, crop management, and disease prevention. This data-driven approach can lead to improved crop yields, reduced chemical use, and enhanced farm productivity.

**6.Integration with Smart Farming:** Solar-based

pesticide sprayers can be integrated into broader smart farming systems. These systems can incorporate various technologies such as IoT (Internet of Things), drones, and cloud-based platforms. Integration allows real-time monitoring, remote control, and data analytics, enabling farmers to optimize operations, track performance, and improve overall farm management.

**7.Environmental Conservation:** Solar-based systems contribute to environmental conservation by reducing greenhouse gas emissions and minimizing the use of fossil fuels. These systems promote sustainable agricultural practices, preserving soil health, and reducing the risk of water contamination caused by excessive pesticide use.

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