



## **Robotic Solar Car Based on Arduino with Bluetooth**

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### **ABSTRACT:**

Starting with intelligent spraying robots This will reduce the risk of pesticides and human health By protecting farmers and reducing labor intensity. The The robot will have complete path planning and navigation system, as well as driving obstacle avoidance Driving control, spraying system and multi sensor Module integration. A spray robot will be designed Obstacle avoidance, including spraying and sensors Integration simulations and analyses. It is not used exclusively To track speed and observation orientation, but Compensate for path error to achieve batter stability and During reliability, there will be a spraying system Modified to eliminate leakage and prevent recurrence Spraying, automatic sprayers are changing accordingly The target is proposed and insecticide spraying A system to help farmers in agriculture. This agriculture vehicle proves to be an effective and efficient machine which can be easily navigated and controlled. The robot can traverse a variety of terrains and seils. The android application is used to control the robot's movement as well as spray pesticides. As a result, the robot's contest is simple, and farmers can easily operate this intelige vehicle. The application was built by using MIT app Inventor. This robot focuses on farmers spraying pesticides from a distance without coming into direct contact with them. Becanie the task's complexity is reduced and the manned task is converted to an unmanned task, this feature would encourage some people to take up agriculture.

**Key Words :** DC Motor, Arduino NANO, Bluetooth Module,Relay

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### **INTRODUCTION :**

Agriculture is the primary source of income for India's population, accounting for nearly 60% of the country's total population. Farmers work their fields and grow different crops based on the environment and available resources. To meet the high demand for food from such a large population. Farmers should use large amounts of pesticides to increase food production. In traditional manual pesticide spraying operations, the pesticide liquid is fully exposed to the work environment, which causes great harm to the human body and can cause skin cancer and asthma if the pesticide comes into contact with the farmer during spraying. Increased pesticide spraying entering the food chain may affect consumer health. So we designed an automated robotic system that can spray a controlled amount of insecticide when an insect is detected to solve the above-mentioned problem. This not only saves the farmer from life-threatening diseases and physical problems, but also saves him money due to the use of prohibited pesticides. Therefore, farmers help the economic development of the country. The use of this type of robot reduces the time required to spray pesticide liquid and will help reduce the work load on the framers in any season or condition. Surely this idea will accelerate their company to reach new heights and also become more profitable. The implementation of our robot is largely dependent on the awareness of the farmers, which we believe will be easily generated due to its numerous benefits. The proposed objective is to increase the safety of farmers during crop activities such as chemical spraying. fertilizers, and pesticides. The research shows its relevance in the fields of Agricultural Engineering, Electrical Engineering, Electronics Engineering, Telecommunication Engineering, Mechatronics Engineering, Environmental Engineering, Biomedical Engineering, Mechanical Engineering etc. Detection and tracking of moving objects is used as a low-level function of computer vision applications, such as video surveillance, robotics, authentication systems, user interfaces through gestures, and the pre-stage of MPEG4 image compression as discussed earlier. Rest of the paper Section II covers a brief overview of the literature review, Section III covers the proposed system and the operation of the robot, Section IV covers the results, advantages and its implications. Applications in various fields. Finally, Sections V and VI include conclusions and future work areas that present the implications of the proposed system.

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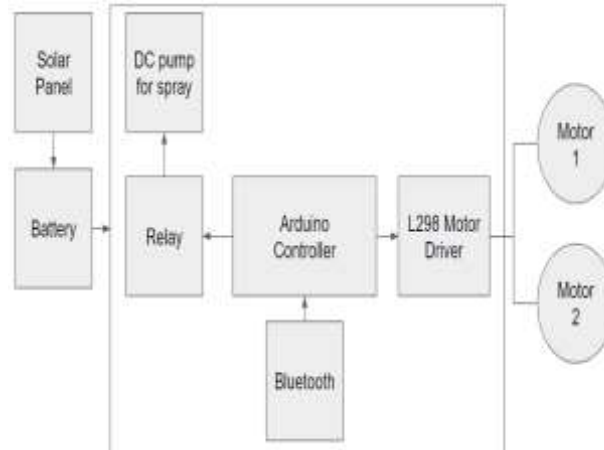
### **OBJECTIVES:**

The points are as below:

1. To accumulate the drone the use of crucial components.

2. To design a mechanism for spraying and managing parameters like spraying pace manage, monitoring tank status, deliver a pesticide/fertilizer spraying tank on it and maybe pass across the fields, change the height of spraying the usage of liner traversing mechanisms, this can permit the advanced system to spray at distinctive heights for one among a kind plants and so forth.
3. To sprinkle chemicals or insecticides or pesticides aerially.
4. To construct this machine in such a way that it can travel across any type of terrain.
5. To make this machine solar powered, so that it can be readily charged using the energy received from the sun.

#### Block Diagram:



#### Software Requirements

##### Arduino Nano

Arduino Nano circuit board with Arduino IDE is capable of reading analog or digital input signals from different sensors, activating the motor, turning LED on/off and do many other such activities. All functionalities are performed by sending a set of instructions to the ATmega328 main microcontroller, on the board via Arduino IDE. The Arduino board also includes Power USB, Power (Barrel Jack), voltage regulator, crystal oscillator, voltage pins (3.3v,5v,gnd,vin), A0 to A5 analog pins, icsp pin, power led indicator, tx and rx leds, 14 digital input/output pins, Aref, and Arduino reset The Arduino Uno is a microcontroller board , based on the ATmega328.The Uno board functioning is different from all other boards in that it does not use the FTDI USB to serial driver chip. Instead, the Atmega328 is programmed as a USB to serial converter. The ATmega328 is a low power CMOS 8 bit microcontroller based on the AVR enhanced RISC architecture structure

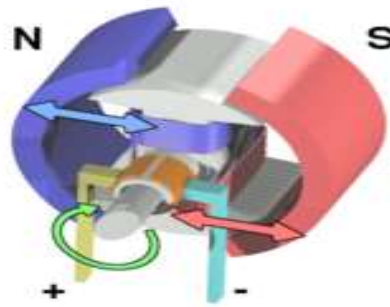
The Arduino project started in 2003 as a program for students at the Interaction Design Institute Ivrea in Ivrea, Italy,[2] aiming to provide a low-cost and easy way for novices and professionals to create devices that interact with their environment using sensors and actuators. Common examples of such devices intended for beginner hobbyists include simple robots, thermostats and motion detectors.



*Figure 1: Arduino*

#### DC MOTOR

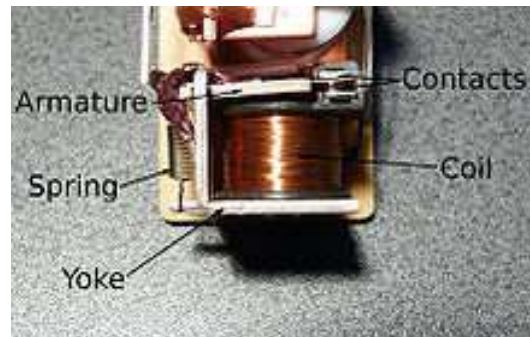
An electric motor is an electrical machine that converts electrical energy into mechanical energy. Most electric motors operate through the interaction between the motor's magnetic field and electric current in a wire winding to generate force in the form of rotation of a shaft. Electric motors can be powered by direct current (DC) sources, such as from batteries, motor vehicles or rectifiers, or by alternating current (AC) sources, such as a power grid, inverters or electrical generators. An electric generator is mechanically identical to an electric motor, but operates in the reverse direction, converting mechanical energy into electrical energy.



*Figure 2: DC motor*

## RELAY

A relay is an electrically operated switch. Many relays use an electromagnet to mechanically operate a switch, but other operating principles are also used, such as solid-state relays. Relays are used where it is necessary to control a circuit by a separate low-power signal, or where several circuits must be controlled by one signal. The first relays were used in long distance telegraph circuits as amplifiers: they repeated the signal coming in from one circuit and re-transmitted it on another circuit. Relays were used extensively in telephone exchanges and early computers to perform logical operations.



*Figure 3: Relay*

HC-05 Bluetooth Module is an easy to use Bluetooth SPP (Serial Port Protocol) module, designed for transparent wireless serial connection setup. Its communication is via serial communication which makes an easy way to interface with controller or PC. HC-05 Bluetooth module provides switching mode between master and slave mode which means it able to use neither receiving nor transmitting data. Specification:

Model: HC-05

Input Voltage: DC 5V

Communication Method: Serial Communication

Master and slave mode can be switched

### Lithium Battery :

Lithium-ion batteries are another popular type of batteries that are used in the Uninterruptible Power Supply (UPS) designs. These batteries are commonly used in portable electronic devices. These are low maintenance batteries having high energy density, small size and light weight which makes them suitable for use in most of the portable devices. But, due to high energy density in comparison to the weight and volume of the Li-ion Battery, there are also some safety concerns while charging the Li-ion batteries. Before designing a charger circuit for these batteries, let us first understand charging methods and topologies involved in charging Li-ion batteries. Also, precautions required in handling, storing and disposing of these batteries are must to know.

### DC pump:

Rated Voltage : DC 6V to 12V (1 amps)

Working current: 0.5A to 0.7A (Max)

Power: 4W-7W

Max Lift: 3m

Max Suction: 2m

Input/output tube diameter: outer 8.5mm, inner 6mm approx

Max Current: Up to 2 Amps while starting up

The maximum flow rate of up to 1 – 3L/min.



*Fig 4: DC pump*

#### **Solar Panel :**

By the end of this century, it is expected that crude oil will be over. Newspaper will miss out of the headlines on petrol price hike. No oil spillage in oceans, no loss of marine bio diversity. Artifact collectors would save a gallon of oil as souvenir of crude oil era. School essays wouldn't have petro products as reason for global warming. But will life stop if crude oil is over?

Humans have shifted from wood to coal, coal to oil, and oil to gas. This shift was due to better performance, efficiency and feasibility of the new fuel. In simple words new fuel were better than the previous one. And now it's time for shifting from crude oil to renewable energy source. And one of the most abundant available sources of energy on earth is solar energy. In fact crude oil, coal etc. are in a way forms of solar energy. Solar energy is inexhaustible source of massive energy. According to recent estimates earth receives an average irradiance of 1367W/m<sup>2</sup> which is also known as solar constant. When this power density is averaged over the surface of the earth's sphere, it is reduced by a factor of 4. A further reduction by a factor of 2 is due to losses in passing through the earth's atmosphere. This value varies throughout the year and also from place to place. Now solar energy isn't just a way of generating power but also for generating money. The world market shares of renewable sources are rising steadily. And today with the development of technology solar energy is a growing market providing ample employment opportunities.

We are using 18W solar panel \ 12V 1.5Amp

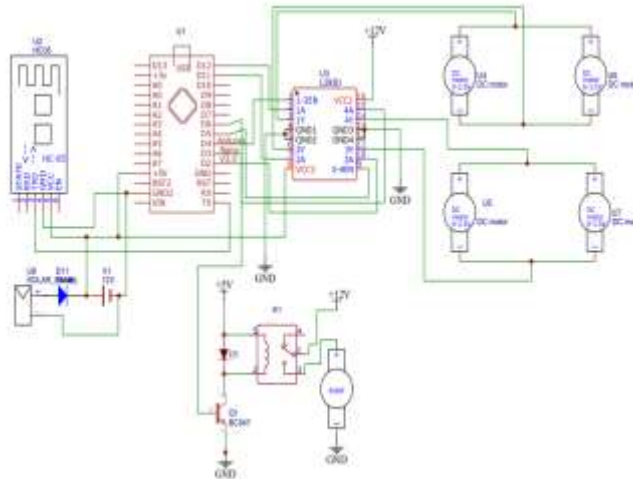


*Fig 5: Solar Panel*

#### **HARDWARE COMPONENTS**

Sr. no.	Main components	Rating
1	Arduino Nano	5V
2	L298D	7-12V
3	DC Geared Motor	12V
4	Solar panel	12V (20W)
5	Lithium battery	12V

6	DC Pump	12V
7	Relay SPDT	5V
8	Bluetooth	4-6V

**CIRCUIT DIAGRAM:***Figure 6: Circuit Diagram***ADVANTAGES AND APPLICATIONS :****ADVANTAGES**

- Minimizing direct contact of pesticides and human body and improving production efficiency.
- They also work with close tolerances.
- They produce low errors and high speed, and the machine can reliably detect high-quality objects.
- Robots can reduce pesticide use on farms Up to 30%.
- Robots have the potential to create jobs for those who must build and repair them.
- Portable can be taken anywhere with access to sunlight.
- Eco friendly powered by renewable energy.
- Physical barriers like walls, doors, etc. do not effect in controlling the car.
- Cost effective no need to for fuel or charging.
- It also gives us the advantage of changing the remote anytime, meaning that we can use any android devices including phones, tablets, computers.
- The project is Bluetooth based because it gives us wider range of control and more efficiency.

**Applications**

- Use is farm for pesticide spray
- Use in farm as well as garden to spray the water for plants / grass

**CONCLUSION AND FUTURE TASKS**

As a conclusion, in order to design and develop an autonomous pesticide spraying for a fertigation farm has been successfully conducted. All the subsystems such as navigation systems and spraying systems are included. Although the navigation part has been tested, the autonomous pesticide sprayer robot can be wirelessly navigated by android app. . For future works, the spraying pressure of the autonomous pesticide sprayer robot will be tested and the electronic circuits need a waterproof structure since the autonomous pesticide sprayer robot deals with a pesticide which is fluid. Therefore, the isolation of the electronic component should be done well by separating each electronic component in the container box to prevent it from being damaged

if the flooding or leakage happened inside the robot. On the other hand, the pest monitoring system should be developed to be an auto monitoring device while spraying the pesticide

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