

### SMART FERTILIZER AND PESTICIDE SPRAYING MACHINE

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*Abstract:* To learn the burden on farmers, India's agriculture system needs to be improved. Numerous farmers have been exposed to harmful chemicals after applying fertilizer and insecticide to their crops. Due to this, it can be managed by a machine that sprays insecticide and fertilizer. This machine's primary goal is to decrease the spraying of insecticides on crops and decreases the load on farmers, which improves health and conserves time, labor, etc. This uses a remote control to simply spray fertilizer and pesticide from a location while sitting down. This proposal suggests creating a wireless-controlled, intelligent pesticide and fertilizer spraying system. This machine is designed on 4 wheels car base mechanism and controlled through an android application. It works on a battery, DC motor, and a pump set. This project helps agriculture to yield better crops and for the health of farmers.

### INTRODUCTION

India's population, which makes up over 60% of the entire population, depends primarily on agriculture for its income. According to the climate and the resources at their disposal, farmers work in their fields to develop a variety of crops. Farmers must utilize pesticides in huge doses to boost agricultural output in order to meet the increasing demand for food from such a vast population. Traditional manual pesticide spraying procedures expose workers directly to pesticide liquid, which is dangerous to the human body, and when the farmer comes into contact with this pesticide when it is being sprayed, which could cause skin ailments including cancer and asthma. As pesticides enter the food chain, increased pesticide spraying may have an effect on consumer health.

Consequently, we developed a spraying machine that is automated. To address the above-mentioned issues, we have developed an automated system that can spray pesticides in minimal quantities only in the event that pests are identified. The restricted use of pesticides, not only protects the farmer from serious illnesses and physical problems but also helps him save money. Because of this, it promotes economic growth among farmers and the country as a whole. This type of machine will assist farmers in reducing their workload in any season or circumstance by speeding up the process of spraying pesticide liquid. This plan would undoubtedly propel their business to new heights and increase its profitability. Our project's implementation heavily depends on farmers' awareness, which we believe would be easily generated due to Its countless benefits.

### **RESEARCH METHODOLOGY**

Below figure 1 shows the flowchart of our proposed system. It consists of MCU Module, H Bridge Driver Module, DC Geared Motor, Active Buzzer, Relay Module, Water level sensor, Water Pump, Nozzle spray sprinkler, Lithium-ion battery, and IP Camera.

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The block diagram of "Smart pesticide and fertilizer spraying machine" consists of Blynk Cloud Server, Blynk Application, Water Level Sensor, Wemos D1 mini, Buzzer, L298N Driver, Relay, R385 Diaphragm Pump, IP Camera, Left and Right DC Motors.

In this project, Mi Camera is used for streaming the video or capturing an image and it consists an user application. Wemos D1 is a development board similar to that of Arduino board and it supports the Wi-Fi module. It is connected to Blynk cloud sever, water level sensor, Buzzer, L298N Driver and Relay module. Water level sensor is used to indicate the level of pesticide or fertilizer present in the tank. Buzzer module consists of a piezoelectric buzzer with a built-in oscillator; thus, the sound frequency is fixed. When the fertilizer level is low, buzzer produces a sound of frequency around 300Hz.

1-Ch Relay Module can be controlled directly via a microcontroller and switch up to 10A at 250 VAC. The inputs of 1 Channel 5V Relay Module are isolated to protect any delicate control circuitry. Wide range of microcontrollers such as Arduino can be used to control this. L298N Dual H-Bridge allow to control two motors easily and independently to 2A each in both directions.

### SYSTEM DESIGN AND ARCHITECTURE

Our proposed system consists of six main components and the following Figure 2 shows the architecture of a smart pesticide and fertilizer spraying machine:



Figure 2: System Architecture

- 1. D1 Mini V2 Node MCU Module is a mini-Wi-Fi board based on ESP-8266EX. It consists of 11 input/output pins, all pins have interrupt/PWM/I2C/one-wire supported in which one is an analog input and a Micro USB Connection.
- 2. The dual bidirectional motor driver is based on the very popular L298 Dual H-Bridge Motor Driver Integrated Circuit. It is ideal for robotic applications and well-suited for connection to a microcontroller requiring just a couple of control lines per motor. This board is equipped with power LED indicators, an onboard +5V regulator, and protection diodes.
- 3. The active buzzer module consists of a piezoelectric buzzer with a built-in oscillator; thus, the sound frequency is fixed. It generates a single-tone sound of approximately 2.5kHz when a signal is high.
- 4. 1-channel 5V control Sigle-Pole Double-Throw (SPDT) High-level trigger AC power supply board can be controlled directly via a microcontroller and switch up to 10A at 250 VAC. Default state of the relay when the power is off for COM to be connected to NC (Normally Closed). This is the equivalent of setting the relay board IN pin to HIGH.
- 5. The water level conductive sensor module has a series of parallel exposed traces to measure droplets or water volume to determine the water level. It is very easy to monitor the water level as the output to the analog signal is directly proportional to the water level. These output analog values can be directly read via Analog-to-Digital Converter (ADC). And can also be connected directly to Arduino's analog input pins.
- 6. A nozzle spray sprinkler is used to spray the pesticide or fertilizer on the plants which are present in the fluid tank. Proper adjustment of the nozzle helps to spray the required number of pesticides on the plants.

### Conclusion

In this system, the issue of spraying pesticides and fertilizer can be solved using IoT. Farmers are conventionally using handoperated and fuel-operated spray pumps for pesticides. The pesticide may come in contact with the farmer during spraying, which will result in skin cancer and other diseases like asthma. The project implementation will help the farmers to overcome this type of problem and it will reduce the effort required by the farmers. It allows the user to operate this spraying machine by using an Android application so that it can be controlled from a far distance. Overall, the results of this spraying machine would depend on the specific design and implementation of the technology, as well as the environmental and agricultural conditions in which it is used. **RESULTS AND DISCUSSION** 

To optimize the application of pesticides and fertilizers, smart spraying equipment might make use of cutting-edge sensors and data analytics. The use of fewer pesticides while yet attaining good pest control and crop development may be made possible by this. Secondly, by reducing the number of chemicals discharged into the air or soil, smart spraying equipment may be able to lessen the impact of spraying on the environment. Also, by automating the spraying process and removing the need for manual labor, a smart spraying machine may be able to lower labor costs and boost productivity.

In general, the performance of a smart pesticide and fertilizer spraying equipment would be determined by the particular design and application of the technology, as well as the environmental and agricultural circumstances in which it is utilized. This spraying machine is built to run on its own without the need for human interaction. This machine can maneuver around obstacles and avoid harming crops by using cameras and other sensors.

The danger that people are exposed to pesticides and fertilizers as well as the time needed for farmers to manually apply chemicals to crops might both be reduced by smart spraying equipment. Compared to conventional sprayers, certain intelligent spraying equipment is made to be more ecologically friendly. They may be made, for instance, to utilize fewer chemicals or lessen the amount of chemical drift that happens during spraying. As a relatively new technology, smart spraying machines are still being studied for their efficacy and possible effects on agricultural practices.



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### References

- [1] Nitish Das, Namit Maske, and Vinayak Khawas, "AGRICULTURAL FERTILIZERS AND PESTICIDES SPRAYERS", April 2015(IJIRST)
- [2]. Pvr Chaitanya, Dileep Kotte, and A. Srinath, "DEVELOPMENT OF SMART PESTICIDE SPRAYING ROBOT", January 2020 (International Journal of Recent Technology and Engineering)
- [3]. U. S. Kaur, A. U. Bhosale, "DESIGN AND ANALYSIS OF MEDIUM SIZE AGRICULTURE SPRAYER AND FERTILIZER DISPENSER", June 2021(IJIRT)
- [4]. K. Gayathri Devi, C. Senthil Kumar, B. Kishore, "A SURVEY ON THE DESIGN OF AUTONOMOUS AND SEMI AUTONOMOUS PESTICIDE SPRAYER ROBOT", November 2021 (El- Cerzeri Journal of Science and Engineering)
- [5] Gauri Harale, Shital Matte, A. K. Gabhale, "DUAL SPRAYER FOR PESTICIDES AND FERTILIZERS", August 2019(IJCET)
- [6]. Tejas Bhalekar, Prof. V.M.Magar, "DEVELOPMENT OF PORTABLE SOLAR OPERATED PESTICIDES SPRAYER", May 2017(GRD Journals)
- [7]. Moggam Sunny, Dr. Syed Jahangir Badshah, "BLUETOOTH BASED AGROBOT USED TO SPRAY THE PESTICIDES", June 2022(IJRASET)
- [8]. Ashish Prakash Borhade, Prakash Madhukar Sutar, "WHEEL OPERATED FERTILIZER SPRAYER", May 2018(IJAERD)
- [9]. R. Panchamoorthy, R. Velappan, "DESIGN AND FABRICATION OF SPRAYING FLUID BY WHEEL PUMP", May 2020(JETIR)
- [10]. Rajashekhargoud Angadi, Rohit L G, "CAM OPERATED AGROCHEMICAL PESTICIDE SPRAYER", January 2017(IJERT)

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