Result Paper On Solar Powered Pesticides Spraying Robot With Wireless Camera

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Abstract- *India is the farmland with a population of three-fourths in agriculture. In accordance with the climate and other resources accessible to them, farmers will grow multiple plants in their field. But some technical abilities along with technological assistance are required to achieve high output and excellent quality. The management of food crops includes very close surveillance, particularly with regard to the treatment of Illnesses, which will cause severe effects after harvest. This is very necessary for effective spraying of the pesticide. The spraying system is operated by wireless remote control. The robot is designed to spray pesticide/insecticide directly onto individual lesions minimizing wastage leading to reduced consumption of chemicals hence making the system cost effective and environmentally friendly. The targeted pesticide delivery prevents dispersion of chemicals in the environment. A prototype is developed and tested on different terrain conditions and is found to operate efficiently. The movement of robot is done solutions to enable precise and targeted pesticide application. In this context, the integration of robotics and IoT technology presents a promising avenue for revolutionizing with wireless remote, motor driver and the processor or embedded system is done through microcontroller.*

Keywords- Soalr Power, Agriculture, IoT, Aurdino, Control System

I. INTRODUCTION

Agriculture is the backbone of human civilization, providing sustenance and livelihoods to billions worldwide. However, traditional agricultural practices, including pesticide application, have often been associated with challenges such as overuse of chemicals, environmental degradation, and reduced biodiversity. In response, the agricultural industry has been undergoing a transformation towards more sustainable and efficient methods, with precision agriculture emerging as a key paradigm shift. Precision agriculture aims to optimize resource utilization, minimize environmental impact, and maximize crop yield through the integration of advanced technologies such as robotics, and artificial intelligence. One of the critical aspects of precision agriculture is the targeted application of pesticides, herbicides, and fertilizers. Traditional spraying methods, which involve blanket coverage of entire fields, often result in wastage of chemicals, environmental pollution, and unintended harm to beneficial organisms. Recognizing these challenges, researchers and farmers alike have been exploring innovative solutions to enable precise and targeted pesticide application. In this context, the integration of robotics and IoT technology presents a promising avenue for revolutionizing pesticide spraying practices. By equipping autonomous robots with sophisticated sensors, actuators, and intelligent algorithms, it becomes possible to identify specific plant species, detect pests or weeds, and precisely apply pesticides only where needed. This approach not only reduces chemical usage and environmental impact but also enhances the effectiveness of pest management strategies. Central to the success of such robotic systems is the ability to accurately identify target plants amidst complex and varied foliage. Computer vision, a branch of artificial intelligence, plays a pivotal role in this process by enabling machines to interpret and analyze visual data from cameras mounted on the robotic platform. By leveraging advanced image processing algorithms, coupled with high-resolution cameras, robots can distinguish between crops and weeds or identify signs of pest infestation with remarkable accuracy.

II. METHODOLOGY

The motors are used for the movement of the robotic vehicle, which are of DC gear motors operated at 12V DC power supply. Two motors have been used to rotate the two wheels clockwise or anticlockwise. This provides motion to the robot. Motors are arranged in a fashion called H-Bridge. H-Bridge is an electronic circuit which enables a voltage to be applied across a load in either direction. It allows a circuit full control over a standard electric DC motor.

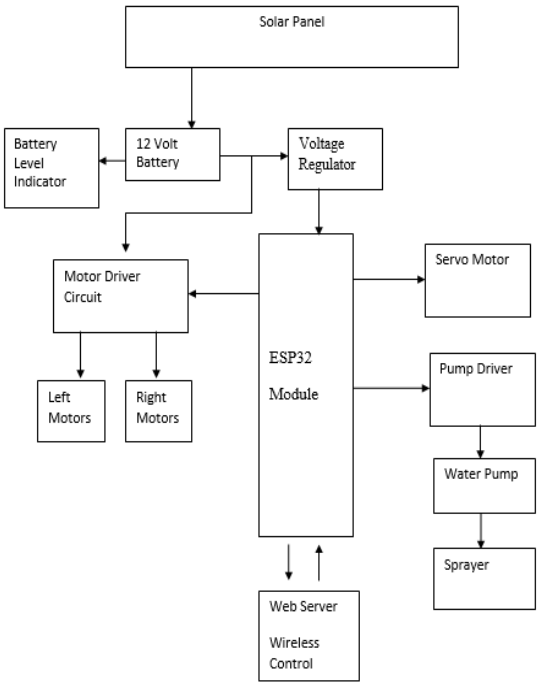

Fig.1 Block dig of model

III. WORKING PRINCIPAL

The ESP32CAM is a tiny module based on ESP32 chip and OV2640. You can even program the ESP32CAM through the ESP-IDF by installing the ESP32 Core. The ESP32CAM equips the ESP32 with everything necessary to program, run and develop on the wonder chip. It also features a Lead charger (IP5306) , so your ESP32CAM project can be battery-powered and truly wireless. ESP integrates WIFI, traditional Bluetooth and BLE Beacon, with 2 high-performance 32-bit LX6 CPUs, 7-stage pipeline architecture, main frequency adjustment range 80MHz to 240MHz, on-chip sensor, Hall sensor, temperature sensor,

An Arduino operating system-based solar pesticides spraying robot platform with remote monitoring and control algorithm through Internet of Things has been developed which will save human live, labor cost, reduces manual error and protect the crops. The system comprises the ESP32 CAM module (small single-board computer), High Pressure Pump, Spraying Nozzle. The Esp32 is the brain of the system. Esp web server controls the robot operation the moving to a specific direction and camera for live streaming videos of required areas. The user is able to access the system with controlling the robot operations.

1. The robot is switched on by using 12V DC batteries as the power supply from external source, then the ESP-32 and L298N Motor driver shield gets power to get started. With this the robot gets moving.
2.The Camera starts viewing and will be used for live viewing on the desired device on which you are given with the IP address or on an application that are built for it.
3. The motors are used for the movement of the robot by taking the instruction given by us.
4. The ESP-32 will be taking all the information from us and giving commands to the entire robot and this is also called heart of the robot and this will be connecting to the internet where communication between the devices will be taken here from monitor to the device. 5. The controlling can be done by the IP entered device browser or the application built for it.
6. The controls will be forward, backward, right, left, stop, flash, servo and speed of motor.
7. The device can be controlled from anywhere in the world with any internet enabled device.
8. The live viewing can be seen in the monitor of the controlling device.

IV. FINAL IMPLEMENTATION

Below figure shows the implementation of project.

Fig.2 Implementation of model

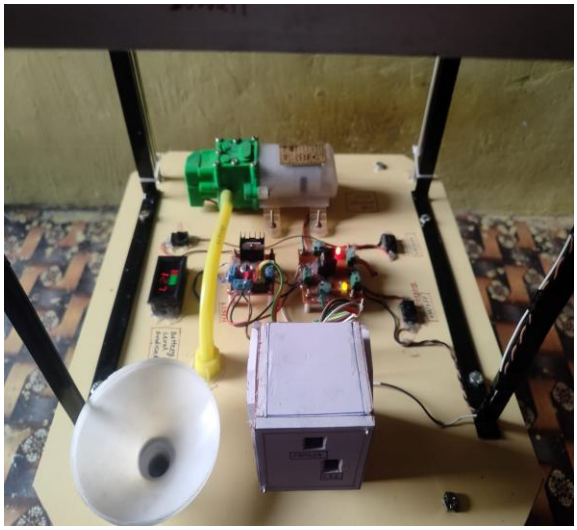

Fig.3 Internal Circuitry slot-I

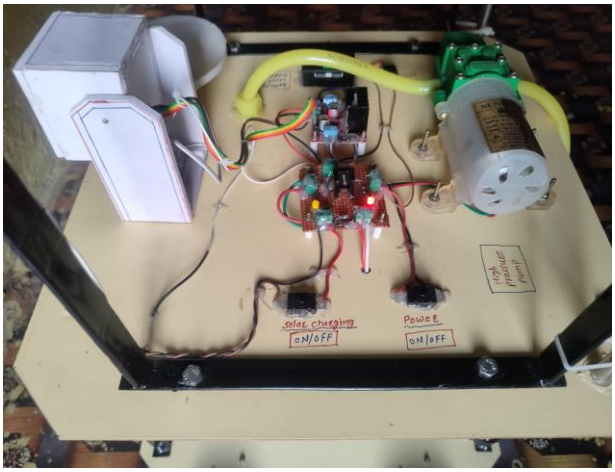

Fig.4 Internal Circuitry slot-II

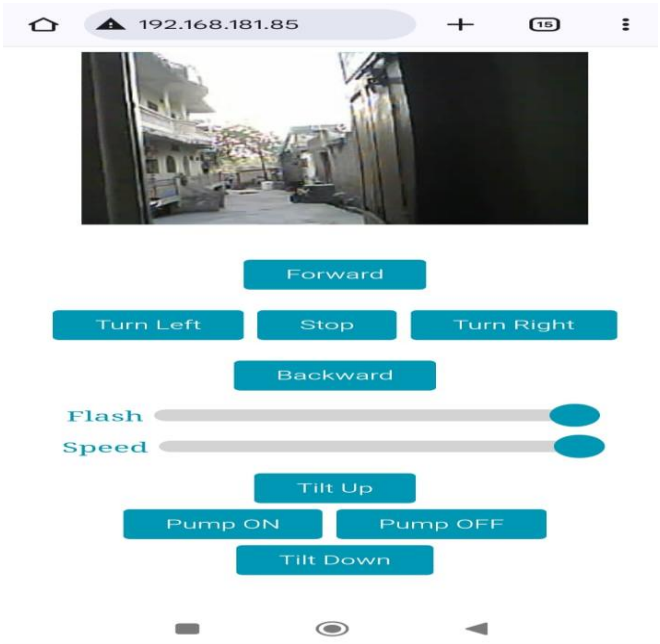

Fig.5Operating View

V. CONCLUSION

The designed and development of solar power remotely operated This project demonstrates the feasibility of integrating solar energy, robotics, and wireless communication into agricultural practices. The Solar-Powered Pesticides Spraying Robot is a step forward in modernizing farming, offering a sustainable, efficient, and safe solution for pesticide application. While the current design addresses several challenges, future enhancements could include AI for pest identification, GPS for navigation, and higher-capacity batteries for extended operation.

The developed system can not only be used for spraying fertilizer, pesticides, fungicides, lawn watering but also for ground surface watering like cricket ground.

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