

Smart Pesticide Spraying Robot

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Abstract: The aim of this project is to create an intelligent spraying robot that will decrease pesticide use and human health damage, allowing farmers to be protected and labour intensity can be reduced. The robot will have full route planning and navigation systems, as well as driving control, spraying mechanism and system construction and obstacle avoidance with multi-sensor module integration. The spray robot will be designed, including spraying and sensor integration simulations and analyses. It is used not only to track motion and monitor orientation, but also to compensate for path errors in order to achieve good stability and reliability. Meanwhile, the spraying system will be improved to eliminate leaks and prevent repeated spraying, with automatic sprays varying according to the target. This project proposes a pesticide spraying system which will help farmers in field of agriculture.

Keywords: DC Motor, Arduino UNO, Bluetooth Module, Pesticide sprayer, Android App.

I. INTRODUCTION

In India agriculture is the main source of income for Indian population which include almost 60 percent of Indian population. Agriculture where farmers work in their field to cultivate different kind of crops according to climate and resources. To deal with this kind of food demand for such huge population, farmers has to use large quantity of pesticides for increasing the food production. The productivity of crop is affected by other major biological parameter such as pest, disease and this parameter can be control by human being for improving production of crop. But it is very harmful procedure for farmers when they spray pesticide, they have to take too many precautions like wearing suitable outfit, gloves and masks etc. For getting best solutions in such cases use of robots is very imminent technological solution which improves productivity and efficiency. It becomes cost effective technological solution. This system is based on developing a robotic vehicle employed in agriculture for spraying dangerous pesticides. This project involves the usage of Arduino microcontroller to control the movement of the robot with the aid of a mobile application. This cost-effective robotic vehicle can improve productive capacity, safety in agricultural applications and meet the demand for labour.

II. LITERATURE REVIEW

A. *Android mobile control smart pesticide spraying robot*

This paper targets the proposed and insecticide spraying 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 soils. 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.

B. *Agriculture robotic vehicle based pesticide sprayer withefficiency optimization*

This paper deals with explanation of how robotics are often applied to different fields of agriculture. The foremost important occupations in a developing country like India is agriculture. It's important to boost the effectiveness and productivity of agriculture by swapping laborers with intelligent machines like robots using new technologies. The paper proposes a brand new strategy to interchange humans in various agricultural operations like detection of presence of pests, spraying of pesticides, spraying of fertilizers, etc. there by providing safety to the farmers and precision agriculture. The developed system involves developing a prototype which uses simple cost effective elements like microprocessors, wireless camera, different motors and terminal elements which helps the farmers in different crop field activities.

C. *Agricultural pesticide spraying robot*

This paper proposes a pesticide spraying system which will help farmers in field of agriculture. The robot will have full route planning and navigation systems, as well as driving control, spraying mechanism and system construction and obstacle avoidance with multi-sensor module integration. The spray robot will be designed, including obstacle avoidance, spraying, and sensor integration simulations and analyses.

It is used not only to track motion and monitor orientation, but also to compensate for path errors in order to achieve good stability and reliability. Meanwhile, the spraying system will be improved to eliminate leaks and prevent repeated spraying, with automatic sprays varying according to the target.

D. Remotely Operated Pesticide Sprayer Robot in Agricultural Field

The paper was aimed at not just to extend the application of advanced technology in the field of agriculture, but also to bring the technology close to the reach of farmers in financial aspect, in a very convenient way. This paper provides an engineering solution to diagnose diseased affected area of plants by automatic sprayer robot remotely.

An automatic pesticide sprayer is involved to spray the pesticide to the localized area of the affected crops. This system is based on sprayer filled with pesticides. The Sprayer movement is controlled by DC motor at low velocity, up & down direction according to plant height. The proposed system can remotely operate through any electronic device like mobile, laptop etc.

III. METHODOLOGY

We build the android application to control this spraying rover. Firstly, we have to connect the android application with HC05 Bluetooth module to control all hardware components of spraying rover. Once we connect Bluetooth, we can easily control this spraying rover. In this rover, we attached four DC motors with L299N motor driver. The connection of the microcontroller, Arduino Uno, DC motor through motor driver and received the power supply from 12V battery. The motor drivers are able to manipulate the rotation of the motor using its phase connected to the gate driver MOSFET on its circuit. Another servo motors are also used here to control sprayer part of this rover.

A servomotor is a rotary or linear actuator that can control angular or linear position, velocity, and acceleration with precision. The main purpose of this servo motors is to move the sprayer according to the user's requirement. We used this servo motors as shoulder part move the sprayer accordingly. Arduino UNO board receive commands from android application and works accordingly. LED is ON if switch is in the active position. LED lights are utilized for lighting at night. In this system we used 6V pump, the pump is connected with Arduino. In order to interface water motor pump with microcontroller, we use current amplifier because microcontroller can't drive high current drawing device. MOSFET module is used to drive motor pump.

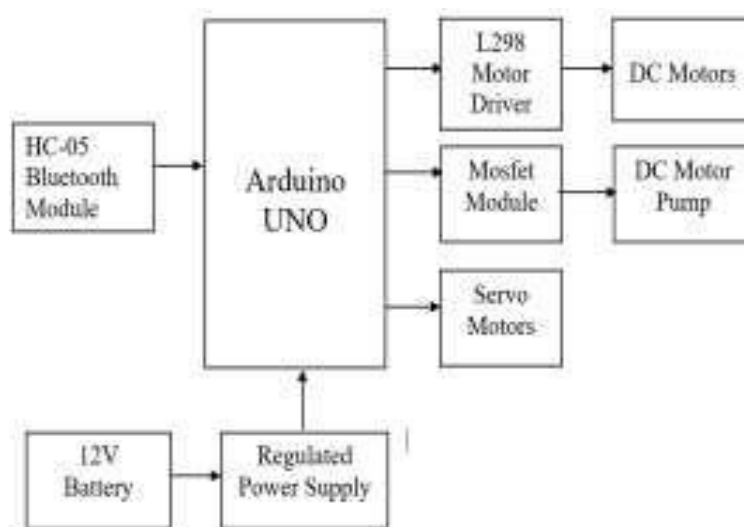


Fig 1: Block Representation

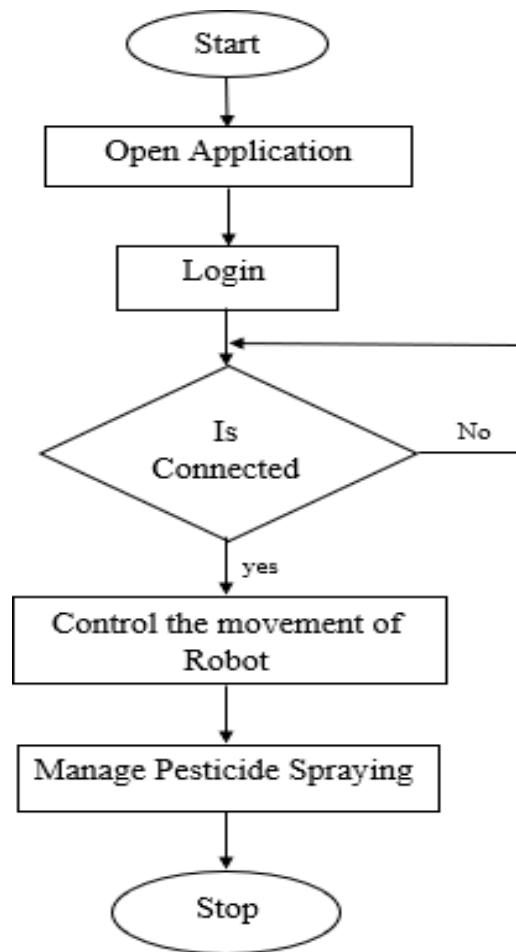


Fig 2: Flowchart

Hardware Components Uses:

1. Arduino UNO
2. DC Motors
3. Bluetooth Module
4. L298N Motor Driver
5. Servo Motor
6. Mosfet Module
7. Water pump

IV. RESULTS

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 soils. The android application is used to control the robot's movement as well as spray pesticides.

As a result, the robot's control is simple, and farmers can easily operate this intelligent 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. Because the task's complexity is reduced and the manned task is converted to an unmanned task, this feature would encourage more people to take up agriculture.



V. CONCLUSION AND FUTURE SCOPE

In this project, we have implemented a pesticide spraying robot. A robot for use in agriculture An Agrobot is a concept for improving the product's performance and cost, which, once optimized, would show to be useful in agricultural spraying operations. Farmers' workloads are reduced, as are health issues. Successfully constructed a robot that can travel on rough surfaces as well as carry a sufficient load of compressor and other equipment. Successful in creating a robot with a strong enough structure to resist the field's challenges. Sure, once this idea is presented in a way that is appropriate for the Indian market, it will undoubtedly aid in lowering the 15% molality rate found in Indian farmers associated with agricultural spraying operations. Projects like this inspire people to pursue agriculture as a full-time or part-time occupation. This is critical in developed countries, particularly India, where agriculture is the economic backbone. In the future, we'll integrate machine learning and artificial intelligence to automatically operate the robot. The robot will then be completely autonomous. Integrated GSM module which could control the start/stop and run operation of the robot.

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