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# Design & Operation of Agriculture Based Pesticide Spraying & Grass Cutting Robot

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**ABSTRACT:**

Spraying pesticides manually outdoors can be challenging due to factors like an open environment and unfavorable weather conditions. To minimize the risks associated with manual spraying and reduce labor intensity, a team developed a pesticide spraying robot specifically for use in a greenhouse. The robot is powered by an 8051 microcontroller and can be controlled using an Android mobile app. The app features remote buttons that allow the user to direct the robot's movement, and the robot's controller is interfaced with a Wi-Fi module for communication between the app and the robot. While the productivity of the prototype may not be optimal, the robot is designed to meet the requirements of pesticide spraying and grass cutting in a greenhouse environment, without the need for human operators. The benefits of using a robotic system in this context include consistent output, quality, and repeatability.

## INTRODUCTION

Since the 1970s, China has made significant progress in popularizing plastic greenhouses and advanced planting techniques, resulting in substantial economic and social benefits. Presently, China has emerged as the world's leading producer of greenhouse crops. However, there are still gaps in greenhouse production management and automation compared to more developed countries. Farmers in China often work under primitive conditions, enduring high temperatures, humidity, and poor ventilation for extended periods. In contrast, developed countries like Japan have achieved a high level of automation in greenhouse management and are advancing towards fully automated, unmanned systems known as "plant factories." These facilities utilize robots and robotic arms for cultivation, liberating them from the constraints of natural conditions. Therefore, it is crucial for China to improve the automation level of greenhouse production equipment and develop agricultural techniques to meet the demands of the new era. The rapid advancements in smartphone technology, including enhanced processors, larger storage capacities, entertainment features, and various communication methods, have made them powerful devices. The introduction of Wi-Fi technology has revolutionized the way people use digital devices, eliminating the need for traditional wired connections. The concept of using a smartphone as the central control unit for robots has gained attention and offers numerous opportunities and possibilities. In this paper, we provide an overview of current mobile-controlled robots. Our work focuses on controlling the robot's movements, such as upward, backward, left, and right, through an Android application.

## LITERATURE SURVEY:

1] Joaquín Gutiérrez and et all. Automated Irrigation System Using a Wireless Sensor Network and GPRS Module. IEEE TRANSACTIONS ON INSTRUMENTATION AND MEASUREMENT, VOL. 63, NO. 1, JANUARY 2014.

The papers publish by Joaquín Gutiérrez and et all represents the design of automated irrigation system which was developed for effective utilization of water resources. It consists of distributed wireless sensor network to check soil moisture and temperature. Whatever data collected from sensors was transmitted to the server & can be monitored via internet.

2] Sammons P J, Furukawa T , Bulgin A. Autonomous Pesticide Spraying Robot for Use in A Greenhouse[A]. Australian Conference on Robotics and Automation , Sydney Australian 2008.

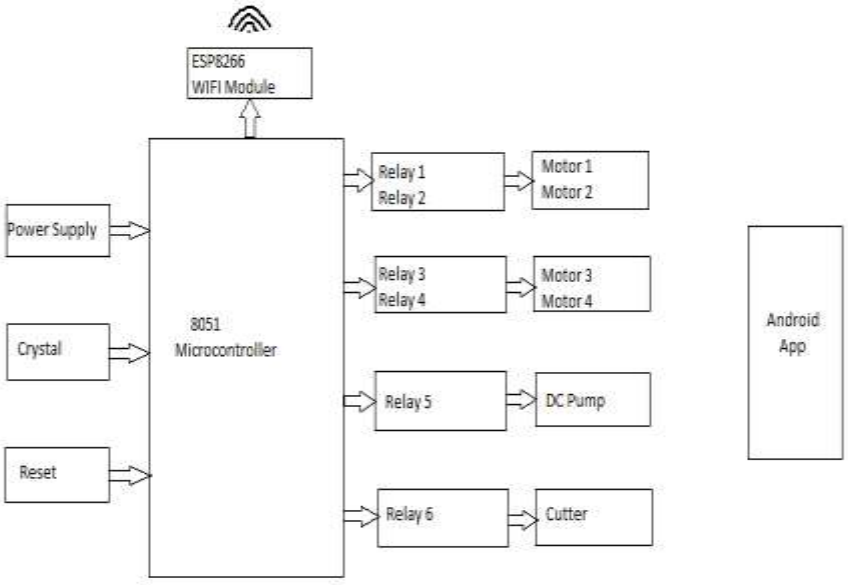
This paper presents an engineering solution to the current human health hazards involved in spraying potentially toxic chemicals in the confined space of a hot and steamy glasshouse. This is achieved by the design and construction of an autonomous mobile robot for use in pest control and disease prevention applications in commercial greenhouses. The effectiveness of this platform is shown by the platforms ability to successfully navigate itself down rows of a greenhouse, while the pesticide spraying system efficiently covers the plants evenly with spray in the set dosages.

3] Simon Blackmore, Bill Stout, Maohua Wang, Boris Runov, Robotic Agriculture The future of agricultural mechanisation? AgroTechnology The Royal Veterinary and Agricultural University Agrovej 10 DK-2630 Taastrup, Denmark.

Developed agriculture needs to find new ways to improve efficiency. One approach is to utilise available information technologies in the form of more intelligent machines to reduce and target energy inputs in more effective ways than in the past. Precision Farming has shown benefits of this approach but we can now move towards a new generation of equipment. The advent of autonomous system architectures gives us the opportunity to develop a complete new range of agricultural equipment based on small smart machines that can do the right thing, in the right place, at the right time in the right way.

Compared to spraying pesticides manually outdoors,the environment has a high temperature,humidity for operating the spray work in green-house or in farms.In order to protect labourer and reduce labour intensity,we have develope a prototype of pesticide spraying robot specially used in the greenhouse and farms.ROBOT is controlled with a ARM7 controller.Designing of latest inverted ROBOT which will be controlled using an REMOTE.We are developing the remote buttons and commands in the hardware by which we can control robot motion using RF communication to interface controller and remote

## BLOCK DIAGRAM:




(1)

## RESULT AND CONCLUSION:

The utilization of battery-operated agriculture robots in the field of agriculture brings about numerous advantages. It enables a significant reduction in manpower, farming tools, and time required for various tasks. Compared to traditional working methods, these machines demand fewer farmers and less time to accomplish their operations. Our agriculture robot has been designed with these limitations and benefits in mind, incorporating a dual functionality of grass cutting and pesticide spraying, effectively addressing the challenges faced in agricultural endeavors. This integrated approach greatly minimizes the negative aspects associated with these tasks. We are optimistic that our robot will meet the needs of Indian agriculture and assist hardworking farmers. By adopting such technologies, we can effectively address the labor challenges prevalent in today's farming practices in India.

## FUTURE SCOPE:

As mentioned earlier, the device circuit is designed using software and simulated accordingly. However, during the hardware prototyping phase, providing power distribution to each module can be a challenge. To overcome this issue, relays can be installed to drive the spray pumps or submersible pumps. This ensures that the sensors, LCD, and other components receive sufficient power supply from the microcontroller's built-in 5V and 3.3V ports. The device can be easily manufactured at a low cost, making it suitable for various settings such as offices, educational institutes, public transport, and regular shops. Its versatility allows for installation in any location.

**REFERENCES:**

1] Joaquín Gutiérrez and et all. Automated Irrigation System Using a Wireless Sensor Network and GPRS Module. IEEE TRANSACTIONS ON INSTRUMENTATION AND MEASUREMENT, VOL. 63, NO. 1, JANUARY 2014.

2] Sammons P J, Furukawa T , Bulgin A. Autonomous Pesticide Spraying Robot for Use in A Greenhouse[A]. Australian Conference on Robotics and Automation , Sydney Australian 2008.

3] Simon Blackmore, Bill Stout, Maohua Wang, Boris Runov, Robotic Agriculture The future of agricultural mechanisation? AgroTechnology The Royal Veterinary and Agricultural University Agrovej 10 DK-2630 Taastrup, Denmark

4] Zhang Ying, Mu Nan, Zhang Xueqin,"The Development Status and Trends of Facility Agriculture Overseas [J]