
DEVELOPMENT OF AN INTELLIGENT PESTICIDE SPRAYING ROBOT

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ABSTRACT

Agriculture is the backbone of the Indian economy. About half of our country's total population chooses agriculture as their main occupation. Agriculture is thriving in states such as Maharashtra, Punjab, Kerala and Assam. It all started with the influence of the "green revolution" that introduced farmers to different agricultural techniques and their benefits. Over the centuries, advances in science have led to the invention of certain modern techniques in agriculture. These modern technologies include the use of tractors to plow fields, the production of pesticides, and the invention of pipe wells. Since water is the primary need in this scenario, techniques have been discovered to help irrigate fields easily and use less water, and reduce human effort. These discoveries improved the standard of living of farmers. Agro technology is the process of applying technological innovations that occur in everyday life to the agricultural sector, thereby improving the efficiency of the crops produced, developing better machinery and machinery to support the agricultural sector, and increasing the quantity and increasing production. Time shortened from work spent on culture. Therefore, in this project, we decided to develop a better mechanical machine that would be cheaper for farmers to use and would be able to show and sow seeds at the same time. This project consists of a better design of a machine that can be used specifically for sowing soybeans, corn, pigeon peas, Bengal grams, peanuts, etc. Due to the lack of availability of various agricultural equipment and sufficient agricultural labor force, different models of seeders are becoming popular in the arid regions of India. Successful crop production depends on the timely sowing of these crops by reducing the tedious labor of farm workers.

Keywords: Nodemcu, Android Phone, Arduino Ide, Water Pump, Spray Nozzles.

I. INTRODUCTION

The record of agricultural progress in India over the last 40 years is very impressive. Agriculture is able to keep up with growing food needs. The contribution of increased land area to agricultural production has decreased over time, and the increase in production over the past two decades has been almost entirely due to increased productivity. The contribution of agricultural growth to overall progress is far-reaching. Increased productivity has fed the poor, increased farm incomes, and created direct and indirect employment opportunities[10]. The success of Indian agriculture stems from a series of steps. The main drivers of agricultural growth during this period were investments that led to the spread of modern crop varieties, increased use of inputs, and the expansion of irrigated areas. Growth has slowed in regions where the technology of the Green Revolution has had a major impact[11]. New technologies are needed to push yield boundaries, use inputs more efficiently, and diversify cropping patterns into more sustainable, high-quality crops. Given the diverse agro ecological frameworks and producers, Indian agriculture faces a wide variety of needs, opportunities and perspectives. Future growth must be faster, more diverse and more targeted. These challenges are having a major impact on how farmer issues are designed, researched, and communicated to farmers. "On the one hand, agricultural research is increasingly needed to address the site-specific problems facing communities. Technology must be developed and adopted to support solutions faced by communities, the majority of which favor resource-poor farmers. The aim of this project is to develop a microcontroller-based system that helps agricultural operations such as seeding and fertilizing at predetermined distances and depths by applicable means. Innovative of our project A great idea is to automate the seeding process for crops such as sunflowers, baby corn, peanuts, beans, vegetables such as ladyfingers and pumpkins, and legumes such as black grams and green grams. Automatic seeding with a DC motor[12]. The distance between two seeds is controlled and changed by a microcontroller. It is also possible to grow different types of seeds at different distances. Once the robot reaches the edge of the

field, it can change direction using the remote switch. The whole process is controlled by a microcontroller. Seed plantation is our daily life carried out by tractors on farms. The traditional method of sowing is manual. However, it requires more time and is always faces labor shortages. India is an agricultural economy and most of the rural population depends on agriculture for their livelihood. Agriculture is India's main livelihood and is practiced mainly in rural areas. Farmers need seeds for tilling and plowing[13].

OBJECTIVE

To increase the production by using smart technology fertilizer spray robot.

To manage the fertilizer spray properly.

To minimize manual intervention by the farmer

II. LITERATURE SURVEY

Wireless control of an automated guided machine paper suggests that in most of the robots considered in this publication are developed for harvesting. Seeding is not yet as important since there is already good tractor based seeding systems. In horticulture there are significantly less robotic applications as in agriculture. The big exception are small moving robots for home use, but robots for precise planting of single plants or autonomous hedge cutting are not yet available on the market, probably due to high development cost and complexity in relation to the market size. It can be concluded that for the creation of growing flower images, no existing platform can be used or further developed, but a new one has to be designed from scratch. This research paper presents design and development of manually operated seed planter machine. In this they present objective of seed planter machine design, factors affecting seed Emergence, some mechanisms. The basic objective of sowing operation is to put the seed and fertilizer in rows at desired depth and seed to seed spacing, the significance of the study is in the contribution in the field of wireless control of automated guided vehicle systems and robotics. Through this project, a simpler approach and algorithm is designed for using low cost and in house available RF transceiver and ASSR with low processing requirements but with effective results. The recommended seed to seed spacing and depth of seed placement vary from crop to crop and for different agro climatic conditions to achieve optimum yields.[3]

Automatic Seed Sowing Machine suggests that the machine has very low cost. Also, the unskilled farmer can easily operate automatic seed sowing system. The design and fabrication of a manually operated single-row Seed planter is cheap, easily affordable by the rural farmers. The single-row Seed planter is very simple to use, various adjustments are made with ease, and it is maintenance free. It ensures uniform and consistent seed distribution in each planted box, and comprising dispensing seeds continuously from a supply hopper in single height, side-by-side. Adjustable gates on the supply hopper and the second hopper control the discharge of seeds and covering material, respectively, to insure uniform and consistent discharge from the hoppers.[1]

An Automated Sowing Seed using AG-ROBOT. The smart agriculture robot can be directed to various directions like forward, reverse, left and right. These directions are commanded by the user by clicking on the respective options on the webpage. On receiving the command, the Arduino will send it to the microcontroller. The microcontroller then drives the motor driver circuit to move the robot. In addition to these movements, several functions like plugging, seed sowing, watering, obstacle detection and obstacle clearance are performed.

The Plugging tool is interfaced with the Arduino. The plugging tool can be operated in three modes namely on, off and mid. The microcontroller will receive the command to work on any of these three modes and it directs the plugging tool to plough the field accordingly.

The seeds are stored in a small container and it is closed with a small flip. This flip is controlled by the servomotor to open and close the container. The servomotor is capable of rotating to 180 degrees. Meanwhile, when the servomotor is at 180 degrees.[5]

Digging and Seed Sowing AGRIBOT can access to Agriculture is a major first step towards a better life, the development of agricultural tools is the basis for agricultural improvement. Now the best way for this project is to develop a system that lowers operating costs and reduces the time to dig and the performance of seed sowing using agribiont. In this machine DC Motors, Moisture Sensor, IR sensor, Ultrasonic Sensor are used with the help of a Wi-Fi interface running Android Application on an oeuvre robot in the field. This reduces staff dependency. The robot for sowing seeds and digging will travel through various rows of soil and perform

digging, sowing seeds and covering the soil by covering it. This paper describes the complete installation of agribiont including hardware and software facet. This paper describes agribiont with advanced feature of soil testing

Development of Smart Pesticide Spraying Robot has solar technology for self-recharge can also be imported in future. This paper suggests the effective use of technology to meet the agricultural growth. This a cost effective and one time investment project. It saves labor cost which also saves total cost for a farmer. By the removal of the disease from crop, a farmer gets more productive output which results in wealth maximization of the farmer. This can be said as an advanced step in the agricultural sector, which avoid food crisis, attract the youngsters, and shows the fragrance of agriculture.[6]

III. RESEARCH METHODOLOGY

The spraying mechanism, in particular, includes an Arduino UNO microcontroller. It additionally includes a tank of 250ml capability to which a water pump is hooked up. a splitter is connected to this water pump along with the two nozzles at the two opposite ends and through this nozzle spraying is practiced. It also includes a motor driving force circuit to govern the pace of spraying. The spraying mechanism plays the following features. Pump ON/OFF manages. It is used to turn on/Off the water pump that is used to spray. Also, the unskilled farmer can be easily operated automatic the spray system. The design and fabrication of a manually operated single-row Seed planter that is cheap, easily affordable by the rural farmers. The system uses the Arduino as main controller, Bluetooth use to control the machine using mobile phone. L298 use to run the DC gear motor. DC pumps for spray the pesticide.

It has induced plant diseases a huge post-effect scenario as it is possible. The quality and quantity of agricultural products decreases significantly. Early detection of pests is a major problem for planting. First phase includes the crop being carefully and periodically monitored. The affected plants are then identified and photographs are obtained for the affected crop component using scanners or cameras. Then these objects are pre-processed, transformed and grouped. Then these images are sent to the processor as input and images are compared by the processor. If the picture is contaminated, an automatic sprayer of pesticides is used to spray. In the area of the seed, pesticide.

For the following reasons, a pesticide sprayer can be used:

- TASK1: Identifying flawed and non-faulty leaves in crops.
- TASK2: Classification of the type of disease assaulted by the leaves.
- TASK3: Sprinkling of pesticides in faulty fields.

Automatic spraying of pesticides is used to inject the pesticide into the targeted zone of the crops contaminated. This scheme is based on two pistons filled with pesticide alternatively. Solenoid valves are under precise control of the inlet and outlet valves. This offers a constant pesticide flow and precision that varies fluid characteristics and flow conditions do not affect. The layout is perfect for spray application of pesticides.

IV. PROPOSED METHOD

The Method that using is an Autonomous bot. This serves as helping hand to the farmers by replacing the manual farming technique with the modern farming technique. In our proposed method, the bot will control by using 2.4GHz Radio Frequency Wireless Controller. It reduces the workload of the farmers by sprinkling pesticides by its own. Automation as a part of solution.

The main concept of this bot is to make an autonomous robot with the help of an Arduino controller to reduce the health issues of the farmers. In our proposed system it consists of three parts, they are: -

1. Input unit.
2. Spray and Control Processing unit.
3. Output unit.

Input Unit: The purpose of the input unit is to give the power supply for all over the circuit and it will act as a storage device too for saving the pesticide liquid.

Spray and Control Processing: The main component of the circuit is Arduino uno controller and it is also known as Heart of the robot. A driver circuit is connected to Arduino, which is used for the movement of the robot. A pesticide pump is also used for transferring of liquid pesticide to the sprayer head from the storage tank.

Output Unit: The output unit consists of direction control unit which is used for controlling the directions via wirelessly. As per our directions, the spraying unit will spray the fertilizers to the plants.

In this system consists of Arduino uno board, power supply, driver module, prototype car module and RF controller and receiver. The main component of the whole system is Arduino uno and it is also called as heart of the whole system, the Arduino microcontroller coordinates the sensor and other components automatically. In the fig.4.1.the power supplies with +12v&-12. A sprayer is used for spraying the pesticides, where sprayers are commonly used for projection of water, weed killers, pest maintenance chemicals etc. Here L293D module is used. It is a driver motor 16 pin IC it is used for driving the robot on specific directions as per our instructions. The aim of the project is to design a pesticide spraying bot with a view of spraying pesticides all over the crop.

V. BLOCK DIAGRAM

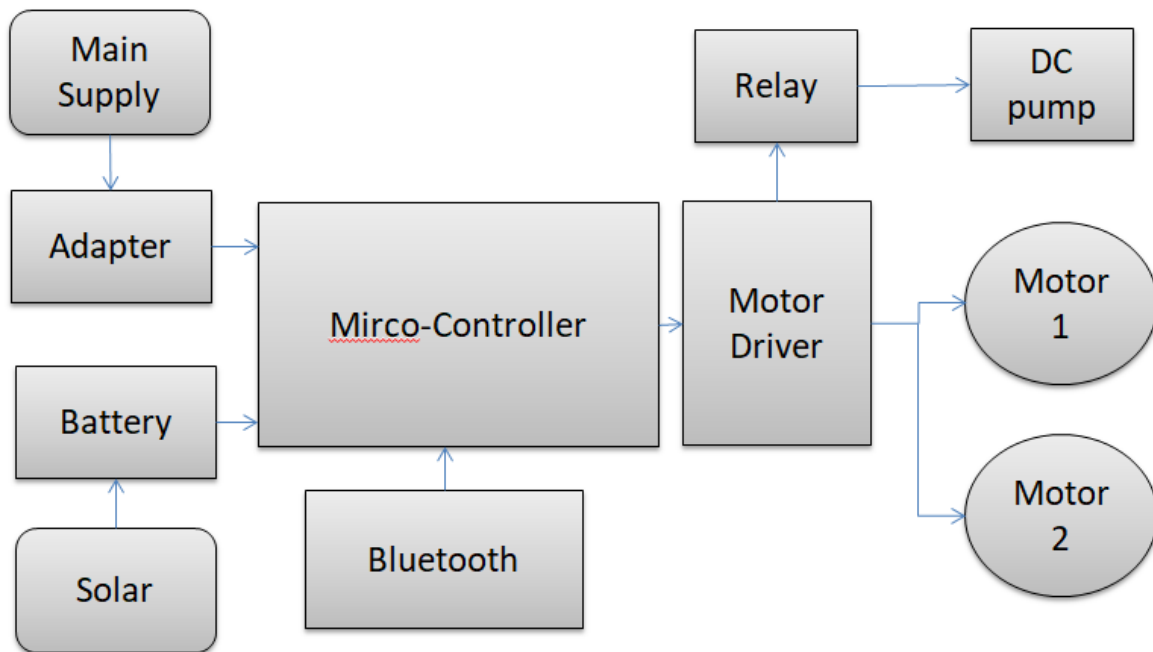


Fig.1 Block diagram of Pesticide Spraying Robot

VI. CONSTRUCTION AND WORKING PRINCIPLE

The construction of Pesticide spraying machine consists of a frame which is used for mounting the components such as D.C encoder motor, Battery. Fig. shows the pesticide spraying machine. The base is used to carry the whole machine. The movement of the robot is controlled by the commands given to the Arduino wirelessly from a safe distance via a radio frequency controller Now it is only left with the spraying mechanism and the storage device for pesticide with the spraying mechanism that uses DC motor for spraying the pesticides, it consists of an arm and a multipoint spray rod is placed on. We can rotate and adjust the nozzle cap by which we can control the fineness of spraying of pesticide. The motor pump that is used in the robot is submersible. That means one part of pump is used to insert the pipe and other part is kept outside. A 12v DC supply is used for the supply and it is connected to the battery. The complete mechanism works on battery. In Figure-4. shown the complete picture of our robot mounted with each and every component. This total arrangement is useful in movement of the robotic sprayer from initial to the final position. This would help you to understand the working and its mechanism. The work performed here has extended the growth of the agriculture and improvement of advanced technology in the agriculture field.

VII. CONCLUSION

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.

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