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Farming Robot for Seeding, Planting and Pesticide Spraying

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Abstract: *This Sowing is the most important process in farming. It is a very tiring and time consuming process that requires a lot of human effort. Here we propose the design and fabrication of a fully automatic seed sowing robot that automates this task. The proposed robot uses four motors for running it in desired directions. We use a small bracket for pouring seeds. The robot consists of a funnel like arrangement in order to pour seeds into a lower container. There we use a shaft with gear like bucket teeth to pick up limited quantity of seeds and pour them on the ground in a steady manner in proper quantity. The front of the robot can be further fitted with a bent plate that drags on the soil to make a slot ahead of the machine before seeds are poured in it. The back portion of the robot can be fitted with a tail like bent rod that is again used to pour soil on seeds sowed thus covering them with soil. Thus the system completely automated the seed sowing process using a smartly designed mechanical robotic system. After 5-10 days it will recheck through machine learning algorithm if seeds is converted into plants or not. if not it will re-pour the seeds in same place as previous.*

Keywords: Image Processing, Pesticide Spraying, Raspberry Pi, Agriculture Robot, Seeding Mechanism

I. INTRODUCTION

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. Disease is recognized in crops as the shift or deficiency of the plants ordinary functions that will generate certain symptoms. The disease that causes agents in plants is mainly defined as any agent's pathogens Most of these pathogenic agents signs are seen in the leaves, stems and branches of the crops. Consequently, the diagnosis of disease and the proportion of disease produced in crops is compulsory for effective and successful plant cultivation. This can be done through taking input images using camera, analysing them using machine learning process. This displays the disease presented on the leaf, stem or plant. This also displays the exposed area to disease and also predicts the remedies, turn on the pesticide sprayer which sprays the respective pesticide on the exposed area to disease. This is very necessary for effective spraying of the pesticide. The movement of robot is done with L293d motor driver and the processor or embedded system is done through Raspberry pi3. We use python code for machine learning which trains the robot with pre-defined images. Since this can be controlled from anywhere without working in the field and being exposed to pesticides, it will be a profit for the farmer. He will stay unaffected by his health condition.

Farming is India's cornerstone. In our nation, approximately 215.6 million acres of soil is irrigated crop region. The Economic Survey says that there is a need to improve farm mechanization in the nation. Increasing Pest infestation productivity control plays a significant role. The farmers are facing significant issues in managing pest infestation. Pests are undesirable insects or germs that interfere with human activity and can bite, ruin food plants or make life harder for farmers. A key point in crop management is early detection and avoidance of pests. Effective control of pests needs some understanding of pests and their habitats. Farmers are currently spraying pesticides around their fields. The main

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disadvantages with regard to this method are: the pesticide may come into contact with the farmer during spraying, which may trigger skin cancer and asthma illnesses. Increased pesticide spraying can impact consumer health as it enters the food chain. Pesticides are also sometimes sprayed on non-affected crops resulting in the same waste. We have therefore created an automated robotic system that can spray pesticides in restricted quantities only if pests are discovered to solve the above-mentioned problems. Not only does this save the farmer from life- threatening illnesses and physical issues, but it also saves his cash because of restricted pesticide use. That is why it helps farmers, in turn the nation, to develop economically. Using this form of robots Time consumption is decreased in spraying the pesticide liquid and it will also assist farmers to decrease the workload and in any season and conditions to do job.

In India, farming is performed using worldly methods. The absence of adequate understanding for most of our farmers makes it even more erratic. The projections are based on a big part of farming and agricultural Operations, which sometimes fail. Farmers must bear enormous losses and sometimes the source of suicide. Since we know the advantages of proper soil moisture and its consistency, air quality and irrigation, these criteria cannot be ignored in crop growth. Therefore, we produced a fresh concept of using IoT to monitor crops and to use intelligent farming. Because of its reliability and remote monitoring, we think our idea will be a benchmark in the agribusiness. Our concept is digitalization of agriculture and farming operations so farmers can track crop requirements and predict their development correctly. Surely this idea will speed up their company to achieve new heights and be more lucrative as well. Implementing our project relies mainly on farmer's consciousness, which we think will be readily generated owing to its countless benefits.

II. LITERATURE SURVEY

Dr. M.G. Sumithra, G.R. Gayathiri proposed in their paper ―Leaf Disease Diagnosis and Pesticide Spraying Using Agricultural Robot (AGROBOT)‖ that Plant diseases have created an immense post-effect scenario as it can significantly reduce agricultural products in terms of both quality and quantity. Early detection of pests is a big issue that concerns planting crops. First phase includes plant observation keenly and frequently. Then the affected plants will be identified and photographs will be collected using scanners or cameras for the affected portion of the plants. Then these images are pre-processed, transformed and clustered. Then these images are sent to the processor as input, and the images are compared by the processor. If the picture is affected, an automated pesticide sprayer will be used to spray the pesticide to the found region of the plant. If not, it will be automatically discarded by the processors and the robot goes on.

Philip J. Sammons, Furukawa Tomonari, and Bulgin Andrew proposed in their paper ―Autonomous Pesticide Spraying Robot for use in a Greenhouse‖ that an engineering solution includes spraying potentially toxic chemicals in the confined space of a hot and steamy glasshouse to the current human health hazards. This is done by designing and building an independent mobile robot that can be used in commercial greenhouses for Tools to control insects and prevent disease. The efficacy of this method is shown by the ability of the platforms to manoeuvre themselves efficiently down the rows of a greenhouse, while the pesticide spraying system effectively covers the plants with spray uniformly in the specified dosages. The results showed that the robot was able to meet the physical standards set by the National Greenhouse Horticulture Centre, so that it could work in its greenhouses. The robot also met the time it had to face and economic constraints. The robot could drive up and down the tracks in the greenhouse. The rails are sensed effectively by the Induction Proximity Sensors and operated satisfactorily. The spraying system developed by another thesis student, when travelling along the rails, was able to selectively spray designated plant groups in the greenhouse. The spray protection provided adequate and consistent dosage to the crops.

Xu Chengzhi Liu Pingzeng, Bai Xueming, Hou Yingkun, Xu Jian – ―Application of Intelligent Control in Spraying Pesticide Simulation System ― in their paper proposed that, On the basis of configuration embedded software, studies, Smart control simulation model is proposed for the spraying of pesticides. In system design, the wireless network of information collection is formed by a Variety of terminals that link to the upper device via a dedicated NC network. We make full use of modular system design methods in terminal design for information collection. By integrating the upper computer with different software modules, intelligent control systems can be easily obtained with different functions. The design of intelligent spraying simulation of pesticides provides conditions for a series of new technique and craft work. Modular structure design approaches for measurement and control system development enhance design

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performance, integrity, and simple system maintenance, as well as enhance the Universality of the method of measuring-control. Experimental results show that the proposed system can simulate all types of situations under natural conditions. It also increased the efficiency of the test and the research comfort. The proposed system has high accuracy measurement and is reliable in operation. For further research into the precision spraying of pesticide technology, all of these can lay the first stone.

Dr. S.R.Gengaje, Snehal M.Deshmukh in their paper ―ARM- Based Pesticide Spraying Robot‖ proposed that Implementation of the predicated agricultural robot, here the robot scans the plant endlessly. Wireless Camera mounted on a robot that captures the crop video and sends it to the central station. The person sitting at the central station decides on the robot's operation. When the user finds that the crop is defective, the robot will be given command and the kinetic will of that robot will be done and the pesticides will be sprayed over the crop. This will be done by the RF transceiver. Robots are used for industrial purposes in agriculture. For farming, the main use of robotics is for planting, fruit picking, driverless tractor or sprayer is designed to replace human labour. The main objective is to stop manual spraying on the real farm with pesticides. Through replacing humans with a robot, it will be done through transmitting crop video to central station. Instead central station monitors robot movements and pesticide spraying, using real-time processor. This will reduce the plant's excessive use of pesticide. Such devices are most commonly used for the application of agriculture to rising man power. The real-time model can be implemented using ARM LPC2148. The device has the advantage of high speed, high quality, reliability and low cost of storage. This system's future context will be to design the system using robot smartness. As per farm area, the pesticide tank capacity is increased.

Mitul Raval, Supath Mohile and Aniket Dhandhukia in their paper ―Development and Automation of Robot with Spraying Mechanism for Agricultural Applications‖ proposed a scientific alternative to the current human health hazards including the application of potentially toxic substances in the enclosed environment. This is accomplished by designing and building an autonomous mobile robot for use in commercial farming applications for pest control and disease prevention. The efficacy of this system is shown by the ability to navigate successfully down a farm's lines, spray the pesticides efficiently while it is managed from a distance by the farmer

III. PROPOSED SYSTEM

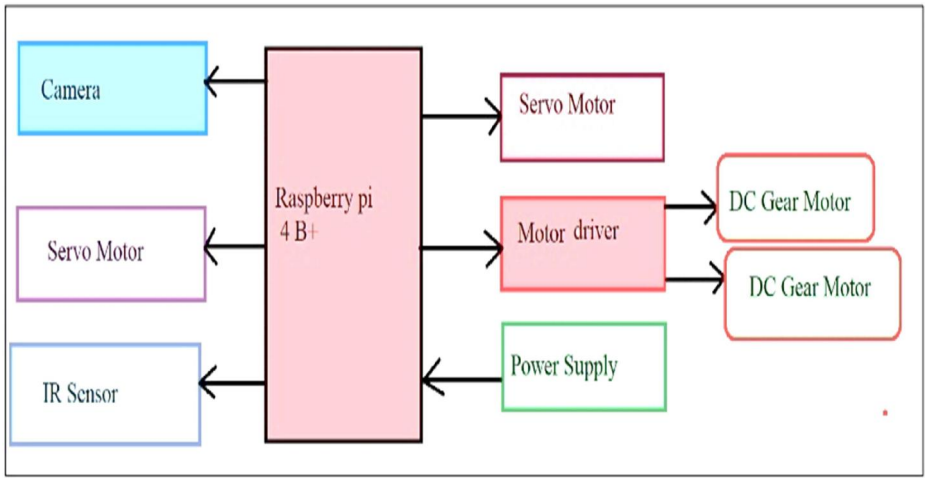

Fig. 1. Block Diagram

Agricultural robot decreases farmer’s general attempts and also improves the work's pace and precision. This robot has been created to improve application precision and yield. As a microcontroller, Raspberry pi is used. Only raspberry pi controls the live video motion, spraying impact and robot movement

- This agricultural robot can display 3 processes, i.e. (a) movement of machine, (b) uploading of video and (c) spraying process for pesticides.
- Sowing is the most important process in farming. It is a very tiring and time consuming process that requires a lot of human effort.
- Here we propose the design and fabrication of a fully automatic seed sowing robot that automates this task.

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- The proposed robot uses four motors for running it in desired directions. We use a small bracket for pouring seeds.
- The robot consists of a funnel like arrangement in order to pour seeds into a lower container.
- There we use a shaft with gear like bucket teeth to pick up limited quantity of seeds and pour them on the ground in a steady manner in proper quantity.

Robot Movement

DC motors are used for the robot's motion that is governed electronically by Raspberry Pi with the assistance of L293D. The HC-05 Bluetooth module receives signals from the input and sends them to the controller, which in turn spins the engine. By obtaining the signal, DC motors are switched ON and OFF by allowing Raspberry Pi to have a specific pin. An adequate velocity is provided by 300rpm DC motors.

Pesticide Spraying Mechanism

Bluetooth module connects to the digital key Raspberry Pi, which receives the signal installed on the operator's Smartphone from the Android app. The floating sensor and submersible pump were mounted inside the pesticide tank. The submersible pump is linked to one end of the tiny diameter pipe and the other end is linked to the sprayer nozzle. The operator can use the Android app to spray particular pesticide if the algorithm says the plant is affected by some disease.

Raspberry Pi 4B

At the heart of the Raspberry Pi 4 specs beats a powerful 64-bit quad-core ARM Cortex-A72 (BCM2711) CPU running at 1.5GHz. It's paired with a selection of memory options: 1GB, 2GB or 4GB LPDDR4 RAM. The new processor, when paired with 4GB RAM, is able to deliver something closer to desktop-class performance (albeit entry-level desktop, not high-end rigs). CPU-heavy tasks like game emulation will also see some notable improvements on the new chip versus the older, slower ones in earlier models

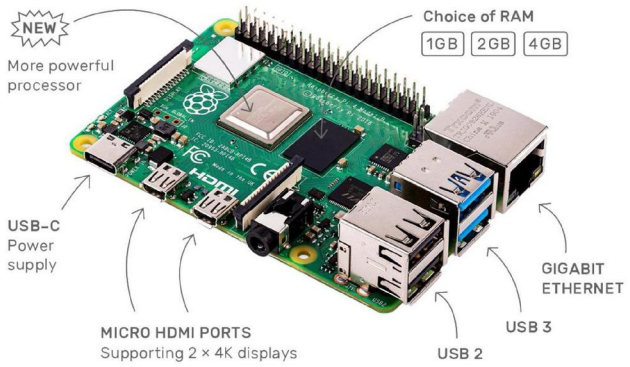

Fig. 2. Raspberry Pi 4B

Servomotor

A servomotor (or servo motor) is a rotary actuator or linear actuator that allows for precise control of angular or linear position, velocity and acceleration.

Specification

- Operating Voltage is +5V typically
- Torque: 2.5kg/cm
- Operating speed is 0.1s/60°
- Gear Type: Plastic
- Rotation : 0°-180°
- Weight of motor : 9gm

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L293D Motor Driver

L293D is a typical Motor driver or Motor Driver IC which allows DC motor to drive on either direction.

Specifications:

- Maximum Peak motor current: 1.2A
- Maximum Continuous Motor Current: 600mA

Supply Voltage to Vcc1(vss): 4.5V to 7V

Automatic Thermal shutdown is available

Available in 16-pin DIP, TSSOP, SOIC packages Automatic Thermal shutdown is available

Available in 16-pin DIP, TSSOP, SOIC packages

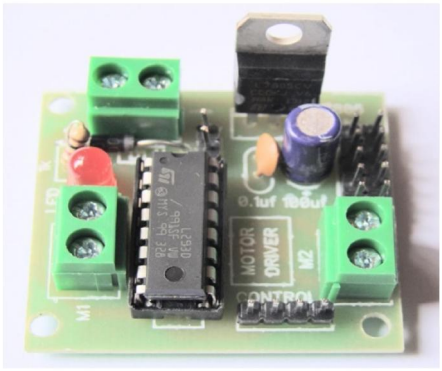

Fig. 4. L293D Motor Driver

IR Sensor

An infrared sensor is a device that detects infrared radiation in its environment and outputs an electric signal.

An infrared sensor can detect movement as well as to measure the heat of an object

Specifications

Board size: 3.1CM * 1.5CM.

Operating Voltage 3.3 ~ 5 VDC

Distance Measuring Range 2 ~ 30 CM

Dimensions 48 x 14 x 8 mm

Weight 15 grams

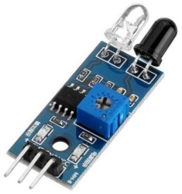

Fig. 4. IR Sensor

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IV. CONCLUSION

We minimized diseases within leaf, stem, and plant by efficiently spray pesticide. Since this can be controlled from anywhere without working in the field and being exposed to pesticides, it will be a profit for the farmer. He will stay unaffected by his health condition. Apart from that, it does not require any supervision for operating. It only needs pesticide level refilling, recharging the battery. It can be operated with a rechargeable Mobile Power bank. 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 labour 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.

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It gives us great pleasure in presenting the paper on “Farming Robot for Seeding, Planting and Spraying Pesticides”. We would like to take this opportunity to thank our guide, Prof.G.S.Dighe, Electronics Engg. Department, Amrutvahini Collage of Engineering, Sangamner for giving us all the help and guidance we needed. We are grateful to him for his kind support, and valuable suggestions were very helpful.

REFERENCES

[1]. Prakash M. Manikar, Shreekant Ghorpade, Mayur Adawadkar,"Plant Leaf Disease Detection and Classification Using Image Processing Techniques," International Engineering Journal, Volume2, Issue 4, 2015.

[2]. Prof. Bhavana Patil, Mr. Hemant Panchal, Mr. SHUBHAM Yadav, Mr. Arvind Singh, Mr. Dinesh Patil, "Plant Monitoring Using Image Processing, Raspberry PI and IOT," Journal of Engineering and Technology, Volume 4, Issue 10, 2017.

[3]. Navin V. Dumare, Prof. S. S. Mungona, "Identification of Cotton Leaf Diseases Using Raspberry PI," Volume 5, Issue 5, 2017, International Journal on Recent and Technology Trends in Computing and Communication

[4]. Prathamesh. K. Kharde, Hemangi. H. Kulkarni, "A Special Method for the Detection of Grape Leaf Diseases," International Journal of Scientific Research, Volume 2, Issue 4, 2016.

[5]. Jayaprakash Sethupathy, Veni S, International Journal of Engineering and Technology, Volume 8, No 5, 2016, "Open CV Based Disease Detection of Mango Leaves."

[6]. Basavaraj Tigadi, Bhavana Sharma, "Detection and Grading of Plant Disease Using Image Processing," International Journal of Engineering Science and Computing, Volume 6, Issue 6, 2016

[7]. Jundare Manisha. A, Jundare Pallavi. T, Jundare Pragati. V, Prof. C.S.Aryan, International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering, Volume 5, Issue 3,2016, "Plant Disease Detection and Image Processing."

[8]. T.V.Sathya Sankari, V.R.S.Mani, "Image Segmentation Implementation UsingRaspberry PI," Trends and Science International Conference on Energy Engineering, 2016.

[9]. A.A.C.Fernando, and C.Ricardo, "Robotics for Agriculture, Unmanned Robotic Service Units for Agricultural Tasks," LEEE Industrial Electronics Magazine, pp. 48-58, Sep 2013.

[10]. B.LTheraja and A.K.Theraja, "The Electrical Technology Text Book in S.I. Units, Volume II, AC & DC machines, Technical Publications for S.Chand