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Agriculture Robot With Seed Sowing,Water Sprayer And Crop Weeding

Revolutionizing Agriculture: The Multi- Purpose Robot

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Abstract: *This paper presents the design and development of a multipurpose robot for agricultural tasks. The robot is capable of performing three key functions: automatic seed sowing, fertilizer spraying, and crop weeding. The robot has been designed to increase the efficiency and productivity of farming operations IOT plays a very important role in smart agriculture. IOT sensors are capable of providing information about agriculture fields. we have proposed an IOT and smart agriculture system using automation. This IOT based Agriculture monitoring system makes use of wireless sensor networks that collects data from different sensors deployed at various nodes and sends it through the wireless protocol Agriculture is the backbone of Indian economy. About half of the total population of our country has chosen agriculture as their chief occupation. The states like Maharashtra, Punjab, and Kerala, Assam are highly involved in agriculture. It all started due to the impact of, "Green Revolution" by means of which farmers came to know about the various techniques involved in farming and the advantages in it. water is the main necessity in this scenario, techniques were discovered which would help in watering the field easily, consume less water and reduce human efforts. These discoveries improved the standard of living of farmers. Agro-Technology is the process of applying the technology innovation occurring in daily life and applying that to the agriculture sector which improves the efficiency of the crop produced and also to develop a better Mechanical machine to help the agriculture field which reduces the amount and time of work spent on one crop. Hence in this work of project we decided to design a better mechanical machine which is available to the farmers at a cheaper rate and also which can sow and seed the crop at the same time.*

Index Terms *- ATMEGA328 microcontroller, Soil moisture sensor,DC Motor,Ultrasonic sensor*

I. INTRODUCTION

Agriculture is the backbone of India. The history of Agriculture in India dates back to Indus Valley Civilization Era and even before that in some parts of Southern India. Today, India ranks second worldwide in farm output. The special vehicles play a major role in various fields such as industrial, medical, military applications etc. [1] The special vehicle field are gradually increasing its productivity in agriculture field. Some of the major problems in the Indian agricultural are rising of input costs, availability of skilled labours, lack of water Identify applicable funding agency here. If none, delete this. resources and crop monitoring. To overcome these problems, the automation technologies were used in agriculture. The agricultural census gives vital information on the distribution of land holdings in our country. According to the census majority of the farmers are having the land less than 1 hectare [2]. This is one of the major drawbacks for the mechanization in agricultural sector in India. The vehicles are being developed for the processes for seed sowing, water spraying , Crop weeding . All of these functions have not yet performed using a single vehicle. In this the robots are developed to concentrate in an efficient manner and also it is expected to perform the operations autonomously. The proposed idea implements the vehicle to perform the functions such as seed sowing, water spraying,Crop weeding.[3] These functions can be integrated into a single vehicle and then performed

II. BACKGROUND ANALYSIS

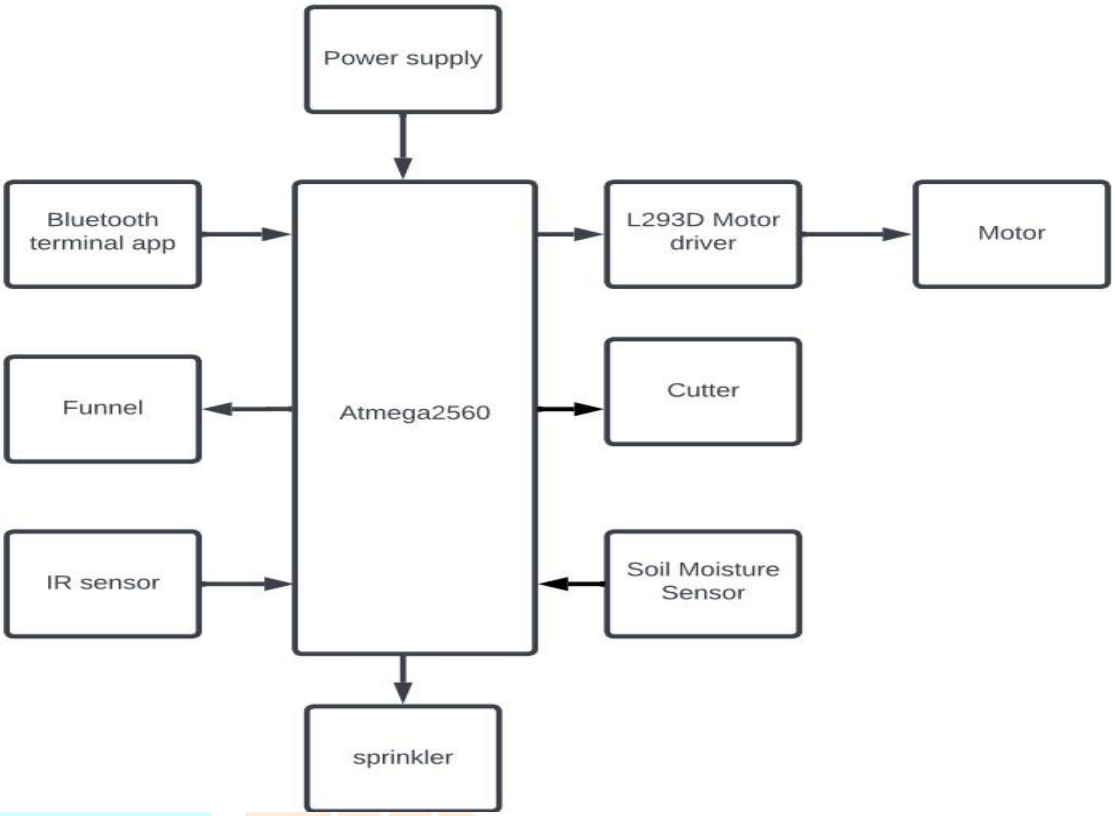
Agricultural robot is a robot deployed for performing agricultural activities. Pollution is also a big problem which is eliminated by using solar panel. The energy needed for robotic machine is less as compared with other machines like tractors. The basic objective is to verify if the soil is suitable for cultivation, put the seed and fertilizer in rows at desired depth and spacing, cover the seeds with soil and provide proper compaction over the seed. In this method, seeds of crops namely wheat, jowar and sunflower is sown by digging the land using drill bit. But before this, the moisture content of soil is verified. The suitable moisture range for wheat, jowar and sunflower are 450-650mm, 600-900mm and 600- 1000mm respectively. These three crops require a depth of 5cm for seed sowing. With the help of this implementation, seeds of these crops are dropped at uniform depth and results in uniform germination. After the crop has achieved desired growth then the fertilizers are sprayed at regular interval. The robot performs verifying the suitability of soil, seed sowing, covering seeds and spraying fertilizers and powered by solar panel with a control of android application. The innovative idea about this project is that robot is not only performing various operations related with farming but also monitoring all the actions related with the movement of robot like obstacle detection , battery voltage and compass sensor output. The proposed system is under agriculture category.

III. CURRENT TECHNOLOGY

Agriculture robots are becoming increasingly common in the field of agriculture, as they can help farmers automate a variety of tasks and increase efficiency. Here are some examples of current technologies for agriculture robots with seed showing, water spraying, and crop weeding capabilities: Seed sowing: One current technology for seed showing is the use of precision planting equipment. This equipment can precisely place seeds in the soil at the optimal depth and spacing for the specific crop being planted. Another technology is the use of drones equipped with seed dispensers, which can fly over fields and distribute seeds in a precise and efficient manner. Water spraying: One current technology for water spraying is the use of autonomous or semi-autonomous sprayers. These sprayers can navigate through fields using GPS technology and apply water or other chemicals to crops with precision, reducing waste and increasing efficiency. Another technology is the use of drip irrigation systems, which deliver water directly to the roots of plants in a controlled and efficient manner. Crop weeding: One current technology for crop weeding is the use of robotic weeders. These machines use sensors and artificial intelligence to identify and remove weeds from fields, reducing the need for manual labor and the use of herbicides. Another technology is the use of precision cultivation equipment, which can be programmed to only disturb the soil around the crop plants, minimizing the growth of weeds. Overall, these technologies are helping farmers improve the efficiency and sustainability of their operations, while reducing labuor costs and environmental impacts.

IV. PROPOSED METHODOLOGY

The block diagram for the proposed project is as shown below. It includes three sensors namely Ultrasonic sensor, Compass sensor and soil moisture sensor. The microcontroller is the heart of the system. Four DC motors are used for movement of the robot. The drill bit is used for digging, sprinkler for spraying fertilizers and bluetooth module for communication.The bluetooth terminal app is use to operate the robot.it is used to control each and every operation of the robot



COMPONENTS	SPECIFICATIONS
1. ATMEGA328 microcontroller	• High Performance, Low Power AVR® 8-Bit Microcontroller • Operating Voltage range: 1.8V to 5.SV • Speed Grade: 0 to 20MHz • Operating temperature range: -40°C to +85°C • On-chip Analog Comparator • Master/Slave SPI Serial Interface • The ATmega328 has 2 KB of SRAM and 1KB of EEPROM.
2. Soil moisture sensor	❖ Operating voltage: DC 3.3V - 5V ❖ Output voltage signal: 0'" 4.2V I. Current : 35 mA
3. Ultrasonic sensor	[1] Operating voltage: +5V [2] Theoretical Measuring Distance: 2cm to 450cm [3] Practical Measuring Distance: 2cm to 80cm [4] Accuracy: 3mm [5] Measuring angle covered: <15° [6] Operating Current: <15mA [7] Operating Frequency: 40Hz
4. HMC5883L Compass sensor	I. 12C Digital Interface II. 3-Axis Magneto resistive Sensors and ASIC in a 3.0x3.0x0.9mm LCC Surface Mount Package Fig. 1. Low Voltage Operations (2.16 to 3.6V) and Low Power Consumption (100 µA) Fig. 2. 12-Bit ADC Coupled with Low Noise AMR Sensors Achieves 2 milli-gauss Field Resolution in ±8Gauss Fields.

5. HC-05 Bluetooth module	TABLE I. Typical -80dBm sensitivity. TABLE II. Up to +4dBm RF transmit power. • 3.3 to 5 V 1/0. TABLE III. Slave default Baud rate: 9600
6. Motor driver (L293D)	[1] Supply Voltage Range: 4.SV to 36V [2] 600-mA Output current capability per driver [3] It can drive small DC-geared motors, bipolar stepper motor. [4] Pulsed Current 12-A Per Driver [5] Thermal Shutdown [6] High Noise Immunity Inputs
7. DC Motor	• Supply voltage: 12V • Input current: 150mA • RPM: 60

B. Experimental Results and Discussions

Experimental Results:

• Efficiency of the robot:robot can be evaluated by the time it takes to finish seed planting, water sprinkling, and field weeding chores compared to human work. The findings may demonstrate the possible benefits of using robots for these activities.

• Accuracy of its operations: The accuracy of the robot's operations can be evaluated by evaluating the precision of seed sowing, water sprinkling, and field weeding. The findings can be used to determine the robot's effectiveness in these duties and to pinpoint places for improvement.

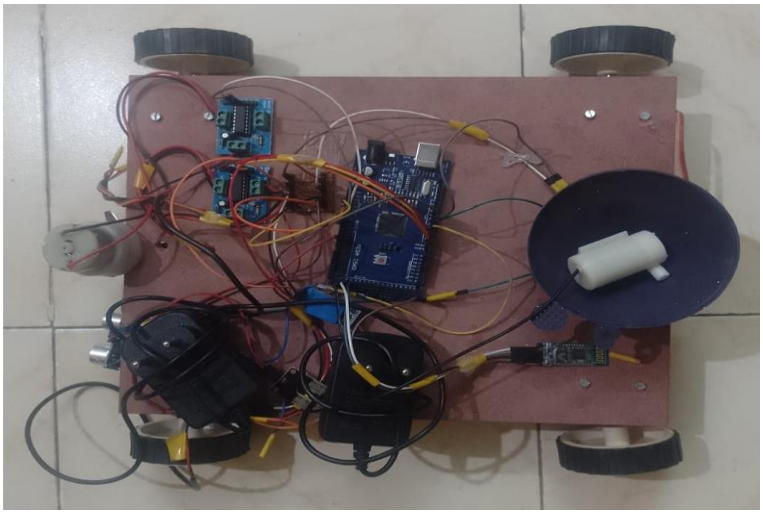
• Impact on crop yield and quality: The influence of the robot's activities on crop yield and quality can be evaluated by comparing crop yield and quality produced with the robot to crop yield and quality grown with conventional techniques. This can aid in determining the robot's efficacy in increasing crop production and quality

Discussions:

• Efficiency of the robot:Discussions can centre on the possible advantages of using robots for agricultural chores, such as lowering labour expenses and increasing efficiency. The talks can also delve into the robot's limitations, such as its reliance on technology and the need for upkeep.

• Accuracy of its operations:Discussions can centre on the robot's ability to conduct seed planting, water sprinkling, and field weeding duties. The possible effect of the robot's accuracy on crop production and quality can also be discussed.

• Impact on crop yield and quality:The possible advantages of using the robot to increase crop productivity and quality can be discussed. The talks can also delve into the robot's constraints in accomplishing these objectives, such as the need for proper land management and product selection.e need for proper soil management and crop selection.



V. CONCLUSION

This project plans to design fully functional automated product. In this proposed work, solar powered seed sowing and fertilizer spraying robot with wireless control will be successfully developed and implemented in real time environment. The proposed system will be developed at low power and low cost with an efficient output. Adding more accessories to the mobile robot and controlling it using an android application will also be possible. This robot with wireless control system gives an alternative way of broadcasting seeds and fertilizers by hand. This robot will perform the seed sowing and fertilizer spraying operations and hence will save labor requirement so as labour cost, labour time and lot of energy.

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