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Design and Development of Agri-Bot for Seeding, Watering and Ploughing

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ABSTRACT: Indian economy is based on agriculture. The backbones for food production are farmers. Traditionally farming is done by human being with the help of bullock carts, tractors and tillers etc. In modern era, the main problem in agricultural field includes lack of labor availability, lack of knowledge regarding soil testing, increase in labor wages, wastage of seeds and more wastage in water. To overcome this problem, we approach designing of agricultural robot for various tasks. Certainly, robots are playing an important role in the field of agriculture for farming process autonomously. In agriculture, the opportunity for robot is enhancing the productivity and the robots are appearing in the field in large number. The proposed system consists of a robotic platform which focuses on implementing all the farming process especially in the field of watering and seeding by using microcontroller, DC motors, servo motor etc.

KEYWORDS: Robotic platform, Arduino uno, micro controller, Dc motors, servo motor.

I. INTRODUCTION

Agriculture is the backbone of rural India. Farmers face problems such as lack of timely availability of efficient workforce, as many have migrated from country side. Hence, to reduce the burden of farmers, automation in the field of farming is necessary. The main reason behind automation of farming processes is saving the time and energy required for performing repetitive farming tasks and increasing the productivity of yield by treating every crop individually using precision farming concept. The robot is able to automatically seed and water, spray pesticides according to the path set by the user using the GUI that was developed. We also detect the disease in plants by using soil lab analysis.

Agriculture is a very important sector in Indian economy. Most of the livelihood in India depends on agriculture. As the knowledge-based farm labours are less, the requirement for them is high and their wages are increasing. Traditionally farming is done by human being with the help of bullock carts, tractors and tillers etc. The main problem in agricultural field includes lack of labour availability, lack of knowledge regarding soil testing, increase in labour wages, wastage of seeds and more wastage in water. The idea of applying robotics technology in the field of agriculture is very new. In agriculture, the opportunity for robot-enhanced productivity is more and the robots are appearing on farms in various guises and in increasing numbers.

II. PROPOSED SYSTEM

We propose this “an Agri-bot for” to overcome all the drawbacks in existing system. It reduces the burden of farmers, automation in the field of farming is necessary. automation of farming processes which saving the time and energy required for performing repetitive farming tasks and increases the productivity of yield.

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farms in various guises and in increasing numbers.

III. WORKING PRINCIPLE

Arduino Uno microcontroller is the master controller of the developed robot. All the operations of the robot are controlled through Bluetooth connectivity. The robot for agricultural purpose is an autonomous robot which is controlled remotely through a wireless Bluetooth connectivity between the Smartphone and the robot. The Bluetooth electronics app is used to control each and every operation of the robot. The Bluetooth HC-05 module is fixed on to the robot which receives signals from the Bluetooth electronics app and sends these signals to the microcontroller for processing of operations. The microcontroller is powered by a 12V DC battery and it consists of a voltage regulator, which is used to regulate the voltage input for the controller. The microcontroller gives a 5V supply to the driver circuit. This supply is insufficient to actuate DC motors. Thus, driver circuit amplifies 5V current into 12V current and drives the motors connected to it. The L293D motor driver 1 circuit is used to control the bidirectional motion and receives signals from the microcontroller. The DC motors control wheel motion and other activities of the robot. The microcontroller sends signals like 00,01,10,11. When signals are like 00 or 11 then the motor is in off condition so there is no movement of robot occur, if else the signal like 01 then the motor will rotate on backward direction else the motor rotate on forward direction (when signal is 10). The L293D motor driver 2 circuit which controls two Dc motors. The Seed sowing will be done using servo Motor as we pour seeds using Cone shaped funnel. The Ploughing Also done using Servo Motor. All these commands can be given by using Bluetooth.

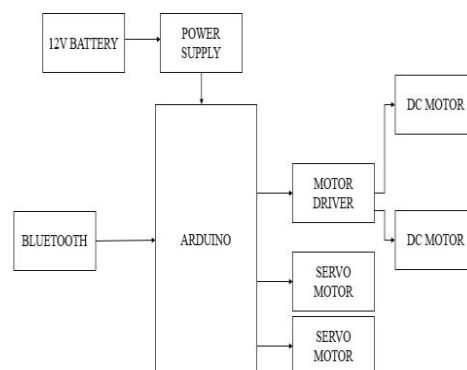


Fig: BLOCK DIAGRAM OF PROPOSED SYSTEM

IV. LITERATURE REVIEW

The development of our agricultural robot and the idea used to implement them, started with the study of various papers.

[1] Designing, employing, and examining an autonomous multipurpose vehicle with safe, reliable and economic operation. This autonomous vehicle goes through the crop lines of Agricultural land and performs duties that are tiresome and/or unsafe to the farmers. First, it's been prepared for spraying, but other configurations are also designed, such as: a seeding, plug system to reach the most notable area of the plants to execute different tasks (pruning, harvesting, etc.), and a truck to move the fruits, crops and crop waste products. The wheels of this robot are designed so that it can travel easily in soft and wet soil.

[2] An automatic robot for agricultural purposes. As one of the styles of development on automation and cleverness of agricultural equipment in the 21st century, all types of agricultural robots have been explored and developed to apply lots of agricultural development in many countries. This bot carries out primary functions like picking, harvesting, weeding, pruning, planting, grafting. They developed a robot to perform various activities in farm like cutting and picking. Image processing is used to identify grass in the field and also the height of the crop. A container is used to place the cut grass and harvested crops. Pesticide spraying is also equipped in the robot.



[3] Improvement in agriculture techniques like automatic planting of seed products on ploughed land by using automatic robot. A robotic vehicle having four tires and steered by DC motors was developed. The seed planting device is fixed on the automobile to seed the seed products in even manner. The device will cultivate the plantation by considering particular rows and specific column at predetermined distance depending on different seed products. The obstacle recognition is considered and sensed by an infrared sensor. The complete assemblage is driven by a 12V rechargeable battery pack. The battery pack can be recharged by using solar power which is also attached to robot. This robot can perform bed preparation, seed mapping, seed placement and reseed operations.

[4] The design, development and the fabrication of the automatic robot which can dig the ground, put the seed products, leveller to close the soil and sprayer to apply water, these complete systems of the automatic robot work together with the power supply and the solar powered energy. Steering operation of robot is done using rack and pinion mechanism. Relay switch regulates power input DESIGN AND DEVELOPMENT OF AGRI-BOT FOR PLOUGHING, SEEDING AND WATERING 9 ECE, SIETK for motor. Obstacle detection is done using IR sensor. A lot more than 40% of the populace on earth selects agriculture as the principal occupation; lately the introduction of the autonomous vehicles in the agriculture has experienced increased interest.

[5] An automatic robot capable of carrying out procedures like programmed seeding, irrigation, and fertilization. In addition, it provides manual as well as auto control. The primary component is ARDUINO that supervises the complete process. Currently, robots are significantly being built into working tasks to displace humans specially to execute repetitive job. Seeding is main steps in farming. In this process seeding is carried out in every row of the farming plot. In irrigation process, the soil sensor is used for monitoring environmental condition. It checks this level and alerts the farmer, then gradually applies little bit of water to the planted seed in every row of the farming plot. The fertilization process is identical to irrigation process however, many plants need fertilizers when the seed germinates and the seed starts to develop. The automatic robot works on solar technology.

[6] An automatic robot which targets employing all the farming process especially on onion crop within a bot by using firebird V automatic robot. The fire bird V robot uses ATMEGA 2560 as master controller, ATMEGA 8 as slave controller, IR, gripper design and other accessories. The suggested system prototype is applied by selecting an area which taking into consideration the agricultural field of any sort of onion crop. The automatic robot picks up the planting area by using detectors and seed products to be planted in the related field using gripper set up of the automatic robot.

[7] A review of the different types of agri-bots which are already available is discussed. An image processing algorithm is used to detect the obstacles in the path of the robot arm. Different techniques to send commands to the bot carry out functions especially the DTMF technique for long range is also discussed. The system that uses an image processing algorithm using IR sensors which may be difficult to work in real world scenario due to different external factors. Bluetooth is used to establish communication.

V. ADVANTAGES AND APPLICATIONS

Advantages:

- Efficient workforce.
- Reduce the burden of farmers.
- Automation in the field of farming.
- It sows seeds.
- It used watering of plants.
- Commercial farming to using it for research and backyard gardening purposes.
- Saves the time and energy.
- Increases the productivity of yield.
- It is used for automatic seed and water, spray pesticides.

Applications:

- Automated harvesting system.
- Weed control.

- Ploughing, sowing, thinning, seeding.
- Nurseries.
- Sorting and packing.
- Row crop, wine yards etc....

VI. RESULTS

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.



Fig: agri-bot

VII. FUTURE SCOPE

The project can be improved with reference to the number of arms we are using in order to sow the seed. We can extend up to 6 or 8 rows at a time. This reduces the time required for seed sowing. The system can be further modified by one or many systems can be monitored through GSM system.

VIII. CONCLUSION

This project introduces wireless technology in the field of agriculture. Exploits features of Android platform to help Farmers Significantly. Provides a flexible user interface to farmer to control the machine effectively. It reduces manual labor requirement which is a boon to the farmers as finding laborers is a very difficult job today. The Agri-bot can work in any sort of climatic condition as well as can work nonstop unlike humans. The time required to carry out the five functionalities reduces considerably in comparison with carrying out the same activities manually. It is a onetime investment which reduces the overall farming cost considerably. This Agri-bot acts as a gateway to automated smart farming.

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