Automated seed sowing Robot

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Abstract:

Autonomous agriculture robotic is one of the promising solutions for precision agriculture. This paper presents the proposed sensor and vision based agricultural robot for sowing seeds. This prototype can navigate on any agricultural land and simultaneously carry out seed sowing operation. The onboard sensors together with controlling via person manually achieves the navigation and localization responsibilities. This paper additionally provides the proposed sensor-based precision seed metering and sowing mechanism. The proposed robot is a micro planter whose primary task could be to sow seeds at prefixed seeding interval within the field. The size of the proposed robot is $30 \times 20 \times 21$cm as $L \times B \times H$ respectively. It additionally has weed cutter.

Key words – seed sowing, seed metering, manual controlling, weed cutter.

Introduction:

Within the current era most of the nations don't have adequate talented man particularly for agricultural sector and it affects the development of creating nations. Manual planting is prevalent in towns of India. But for huge scale this strategy is exceptionally troublesome. The farmer has to spend his more time in planting. But time available is less for him. Thus, it requires more man power to complete the task within stipulated time which is costlier. Moreover, more wastage happens amid manual planting. Hence there is need of developing such a machine which will help the farmer to reduce his efforts while planting. In this model, seed sowing method is computerized to lessen the human effort and increase the yield. The plantation of seeds is automatically finished through using DC motor. The farm is cultivated using the device, depending on the crop considering unique rows & specific columns. The gadget may be controlled remotely with the assistance of smartphone. Assembly language is used in programming the microcontrollers. The microcontroller is used to govern and reveal the system of gadget movement of bot with the help of DC motor.

Traditional Sowing Methods:

Conventional strategies include a funnel-shaped tool is used to sow the seeds traditionally. The funnel is filled with seeds and the seeds pass through two or three pipes with sharp ends. These ends enter into the soil and the seeds are placed there. Other methods are broadcasting, dibbling, drilling, seed dropping behind the plough, transplanting, hill dropping etc. Conventional sowing strategies have following barriers; 1) In manual seeding, it isn't always feasible to acquire uniformity in distribution of seeds. A farmer may also sow at desired seed charge but inter- row and intra – row distribution of

seeds is probably to be choppy resulting in bunching and gaps in discipline.
2) Bad control over depth of seed placement.

3) It's far important to sow at high seed quotes and bring the plant population to desired stage through thinning.

4) Labor requirement is high due to the fact persons are required for sowing seed and fertilizer.

5) The effect of inaccuracies in seed placement on plant stand is more in case of plants sown beneath dry farming conditions. At some stage in kharif sowing, placement of seeds at choppy intensity may additionally result in terrible emergence due to the fact next rains convey additional soil cowl over the seed and have an effect on plant.

Working principle:

Why we used seed sowing machine?

The Automated seed sowing technology is a method that helps in order to reduce the human efforts and time as it requires less amount of manmade labor and can be handle efficiently without a skilled operator. Seeding manually requires lots of time, therefore this technology develops which reduce much amount of time with proper efficiency, less time consuming, accuracy in sowing seed at specific distance. It works on simple mechanism; a battery-operated servo motor is used transmits the rotary motion to seed dispenser with the help of chain drive. When the we put seeds into the funnel and through servo motor it opens and closes the nozzle of seed dispenser seed drops into the ground, there is cultivator for digging and covering the seeds by soil. Also, we have used soil moisture sensor with this module, which tells when our plants need watering by how moist the soil is in yard. The two probes on the sensor act as variable resistors. Also, the motion of robot is controlled via phone which is connected through module HC-05

Literature survey

[1] To develop a system which minimizes working cost, reduces time for digging operation and seed sowing operation.

[2] To sow seeds in desired position hence assisting farmers in saving time and money

[3] Designing a robot with 4 subsystems-a digger mechanism, a seed dropping mechanism, wheel mobile platform and irrigation mechanism

[4] This paper presents the proposed sensor and vision based agricultural robot for sowing seeds. This prototype can navigate it on any agricultural land and perform seed sowing operation simultaneously. The swarming technology can be incorporated to use multiple robots to reduce sowing time.

[5] The novelty of the proposed low cost indigenously developed modular vehicle lies in design of its seed sector with extremely low miss rate distinguishes the vehicle from other designs.

[6] This paper offers the idea of a new era of smart, flexible and interconnected independent robotic device operating with

human co-employees in farms and food factories.

[7] An autonomous seed sowing robot is designed which divides the field into a grid with intersection points as places where seeds are sown. Sensors are used for obstacle detection.

[8] An autonomous robot is designed which switches ploughing system optionally when required.

[9] The proposed idea is based on wireless sensor nodes for sensing field parameters of irrigation system like temperature and soil moisture. It makes use of multiloop networking for field region communication and additionally gives required facility to the field using Firebird V robot.

Problem statement

- Design and development of an automated seed sowing robot for-
  1. Putting seed in the soil
  2. Performing soil analysis and check soil fertility using various sensors (Moisture, humidity)
  3. Cut down unwanted plants using weed cutter.

Components List:

SR.NO	NAME	QTY
1	Wheels	4
2	DC Motor	4
3	Motor Driver (L298N; L293D)	1 Each
4	Servo motor	1
5	Bluetooth module HC-05	1
6	Voltage regulator 7805	2
7	Moisture sensor	1
8	Weed cutter	1
9	Arduino uno	1
10	Lithium Battery(25V)	1
11	Wires	As per Requirement

Soil Moisture Sensor

With this module, you can tell when your plants need watering by how moist the soil is in your pot, garden, or yard. The two probes on the sensor act as variable resistors. Use it in a home automated watering system.

Bluetooth Module HC-05

The Bluetooth Transceiver HC-05 TTL Module (With EN Pin) Breakout is the latest Bluetooth wireless serial cable. This version of the popular Bluetooth uses the HC-05/HC-06 module. These modems work as a serial (RX/TX) pipe.

Motor Driver L298N and L293D

It uses the popular L298N and L293D motor driver IC and has an onboard 5V regulator which it can supply to an external circuit. It can control up to 4 DC motors, or 2 DC motors with directional and speed control. Difference between them is L298N is a full bridge motor whereas L293D is half bridge motor.

DC Gear Motor

This is 12V DC motor which has a gearbox of 45mm diameter. The planetary type gearbox of this motor has a metal gear and a center shaft. The Shaft of the motor is loaded with bearing for wear resistance and smooth operation.

Arduino Uno

Arduino Uno is a microcontroller board based on the ATmega328P. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP header and a reset button.
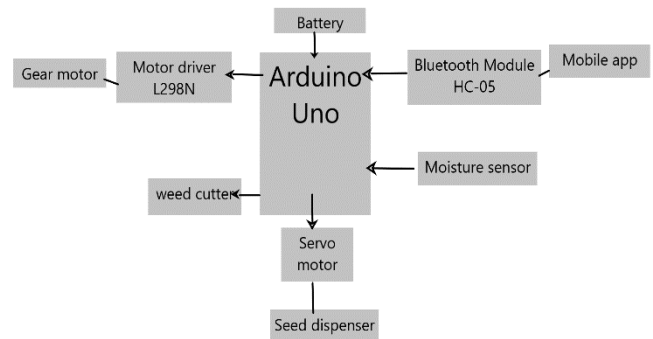
Voltage regulator

The LM7805 is a voltage regulator that **outputs +5 volts**. Like most other regulators in the market, it is a three-pin IC; input pin for accepting incoming DC voltage, ground pin for establishing ground for the regulator, and output pin that supplies the positive 5 volts.

Design Details:
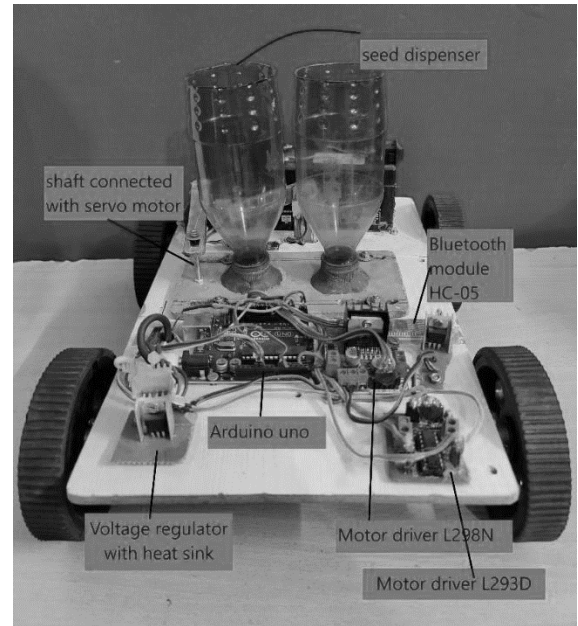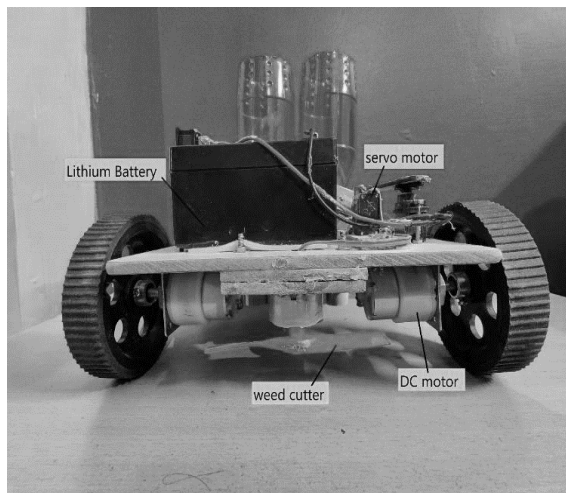
Block Diagram:

ADVANTAGES & DISADVANTAGES

Advantages

1. Exertions may be removed as maximum of the works are finished via agricultural robots. weeding, irrigation are the primary works associated with the farm which needs manpower and the robots can cope with these kinds of work. One agricultural robot can deal with the handling power of approximately 10 employees.

2. Via the advent of agricultural robots, farmers will experience self- employed as their dependency on labors decreases. The funding and profit may be accomplished once and the earnings might be big as the operating charges decrease.

3. The consumption of water can also be decreased.

4. There can be a drastic boom inside the production of crops

Disadvantages

1. Implementation of robotics in agriculture is very costly.

2. The complexity of the farm increases and there is an equal risk if proper care is not taken.

3. The labor employed for the farm should be well skilled and educated in technology.

APPLICATION &FUTURE SCOPE:

Application

Changing human labor with automation is a developing trend across a couple of industries, and agriculture is no exception. maximum factors of farming are fairly hard work-intensive, with a whole lot of that labor made from repetitive and standardized duties—a really perfect niche for robotics and automation.

Future Scope

- The traditional farming needs to be induced with the robotic mechanism and is very much required in precision farming.
- As agricultural robots have already entered into farming sector, there would be a mobilization in farming too. There would be remote-controlled robots moving in the agricultural fields in order to check the herd.
- Due to the introduction of agricultural robots, there would be less labor required and an individual can plan and implement the operations of the farm by himself without depending on the availability of labor.

Conclusion:

By implementing this system, agricultural, horticultural lands, gardens can be easily and automatically sowed also can get alert for irrigation. This system is cheaper and efficient when compared to other type of automation system also it saves time. In large scale applications, high sensitivity sensors

can be implemented for large areas of agricultural lands.

Thereby reducing the stress on farmers.

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