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Seed Sowing System using IoT

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***Abstract*:- Agriculture requires technologies that are easier for farmers to understand, implement, anduse. It is a device that costs less money and requires less human effort and time. Implementation is very necessary for the success of the agricultural industry. That's why we developed an IoT controlledseeding system that helps farmers plant seeds in the right place and save time and money. A machine used in small-scale farming to perform tasks such asplowing, seeding, and picking. Sowing seeds is one of the main processes in agricultural activities. This requires a lot of human effort and time investment. All growers must be suitable for all types of farms, all types of crops, and must have sturdy construction and reliability. These are the main requirements of growers. Therefore, we have created a manually operated seeder when the farmer has to do less work, increasing seeding efficiency and reducing the problems associated with manual seeding. With this machine we can plant seeds with different shapes, sizes and distances between two seeds. You can also bet more efficiently and accurately. By using raw materials, we made it cheap and easy for small farmers to use. The design has been greatly simplified so that farmers or untrained operators can operate the machine efficiently. Adjustment and maintenance of the machine has also become easier.**

INTRODUCTION

The progress India has made in agriculture over the past 40 years is quite astonishing. The agricultural sector has been able to meet growing food demand. The importance of land expansion for agricultural production has declined over time, and production growth has been driven almost entirely by productivity growth over the past two decades. Agricultural production has made a significant contribution to the overall development. Increased productivity has helped feed the poor, increased farm profits, and created direct and indirect employment opportunities. During this time, the main sources of agricultural growth were the spread of new crop varieties, intensification of input use, and investment leading to expansion in the irrigated region. Growth has now declined in areas where' Green Revolution ' technologies has major impact. New technologies are needed to push out yield boundaries, make more efficient use of inputs, and diversify toward a more sustainable and higher value which means a field. Culturia, meaning agriculture, the Indian farmer faces more problems about the quality of the agricultural product than others owing to traditional methods of agricultural operation. Making holes or slots with sticks or tools and manually dropping seeds is done for sowing in small areas by loosening. Many countries do not have a skilled labor force directly suited to the current generation of agricultural sector, which affects production in developing countries. So, it's time to automate the sector to solve this problem. In India, 70% of the population is dependent onagriculture. So we have to learn animal husbandry. The innovative idea of our project is to reduce human efforts and increase productivity by processing seed crops such as sunflower, maize, peanuts and vegetables such as soybeans, ladies fingers, pumpkins and legumes such as black gram, green gram etc. . A microcontroller is used to control and change the distance between the two seeds.

Different types of seeds can also be planted at different distances. When the robot reaches the end of the field, it uses a remote switch to change direction. In daily life, planting seeds in farms is done by tractors. The traditional sowing method is manual. However, it takes longer and is constantly facing labor shortages. India is an agrarian economyand the most rural.

1.1 PROBLEM STATEMENT

As you know, India is characterized by agriculture. In India, 50% of the population is dependent on agriculture. If India's GDP reaches 9- 10% in the next 30 years, 50% of the population would mean about 70 million people, more than double the US population, so is impossible without a revolution in the agricultural sector. In the current scenario, most countries do not have a sufficiently skilled workforce in the agricultural sector to impact growth in developing countries. Therefore, farmers must use improved cropping methods. Now is the time to address this issue. This eliminates the need for labor and also avoids seed waste.

1.2 PROBLEM MOTIVATION

Because we are interested in embedded electronics-based projects, there are many benefits to embedded systems despite electronics-based projects. You can use source code delays to control the speed of an electrical component, a DC motor. He is motivated to do this project because it is an IoT-based agricultural project. Covers controllers, DC motor interfaces, ultrasonic transducerinterfaces, and linear actuators used to open andclose valves. For example, seed delivery.

LITERATURE REVIEW:

COMPARATIVE PERFORMANCE OFSEEDING DEVICES WITHOTHER SOWING METHODS

In [1], this journal the authors used a manually operated template planter, which was designed and developed to improve planting efficiency and reduce the chores associated with manual planting methods.

In [2] of this journal, the author used a video interaction camera to detect obstacles during sowing. You can use smart robots that sow seedsautomatically without human intervention.

In [3] of this journal, the authors report that the idea arose to implement automation in the seed planting process.

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Manufacturing components: solar panels, funnels, DC motors, batteries, wheels, shafts.
In [5] of this journal, the authors state that the system uses many automatic methods that require little labor. The project aims to develop prototypes of autonomous agricultural robots that include automatic control systems and can be applied in different stages of horticulture. The general concept of a robotic agricultural machine is to selectively harvest or easily weed the desired prototype
In [6] of this journal, the authors report that the system module is based on the ESP8266 Wi-Fi microcontroller. This module connects to the central server via Wi-Fi environment using data transmission in JSON format via HTTP protocol using IP cameras. Programs in the module are designed to be as simple as possible to save resources and achieve the shortest response time. The modules of this smart home system have been tested and proven to work with smart home systems that provide electrical controls, automatic door locks, power consumption statistics, infrared furniture and cameras for direct monitoring of the room.

Ultrasonic sensor:

Fig 1 : Ultrasonic

An ultrasonic sensor is a component that helps to measure the distance of the object using ultrasonic waves. Ultrasonic sensors use transducers to send and receive ultrasonic pulses to convey information about the proximity of an object. High- frequency sound waves reflect off the boundary, creating a distinct echo pattern. It emits 40 kHz ultrasonic pulses that propagate through the air and bounce off the sensor when obstacles or objects are present. Ultrasonic sensors are a great solution for detecting transparent objects. As far as liquid level measurement is concerned, applications using infrared sensors, for example, suffer for this particular use case due to the translucency of the target. For presence detection, ultrasonic sensors detect objects regardless of their color, surface, or material (if the material is very soft, such as wool it absorbs sound). A reliable choice. To calculate the distance between the sensor and the object, the sensor measures the time it takes for the transmitter to emit sound and contact the receiver. The formula for this is: D = ½ T x C, where D is distance, T is time, and C is the speed of sound at ~343 meters persecond. For example, if a scientist places an ultrasonic sensor against a box and the sound is reflected back after 0.025 seconds, then the distance between the ultrasonic sensor and the box is D = 0.5x 0.025 x 343.

DC Motor:

Fig 2 : DC Motor

DC motors belong to a class of rotary electric motors that convert direct current (DC) electrical energy into mechanical energy. The most common type is based on the force produced by a magnetic field. Almost all types of DC motors have an internal electromechanical or electronic mechanism for periodically changing the direction of current flow in some part of the motor. The DC motor was the first motor to be widely used because it could be powered from the existing DC lightingpower distribution system. The dc motor speed can be controlled over a wide range by using variable supply voltages or by changing the amount of current in the field windings. Universal DC powered, lightweight brush motors used in portable power tools and equipment. Large DC motors are currently used to drive electric vehicles, elevators, winches and steel mills.

NODEMCU:

Fig 3: NODEMCU

The name "NodeMCU" is a combination of "node" and "MCU" (microcontroller unit). Strictly speaking, the term "NodeMCU" refers to the firmware, not its development toolset. Both the firmware and breadboard design are open source. NodeMCU is an open source firmware that can be used to develop open source breadboards. The name "NodeMCU" is a neologism combining "node" and "MCU (Microcontroller Unit)". Strictly speaking, the term "NodeMCU" refers to the firmware, not its development toolset. Both the firmware and breadboard design are open source. The firmware uses the Lua scripting language. The firmware is based on the eLua project and is based on the Espressif Non-OS SDK for ESP8266. We use many open source projects like SPIFFS. Due to the limitations of the source, the user must select the modules that match the project and build the firmware as needed. Support for 32-bit ESP32 is also implemented. A commonly used prototyping hardware is a board that acts as a dual in-line package (DIP) that integrates a USB controller onto a small surface-mount board that contains an MCU and antenna.

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Choosing the DIP format makes it easy to prototype on a breadboard. This design is based on the original ESP-12 module for the ESP8266.

DC Motor Driver:
L298N Driver:

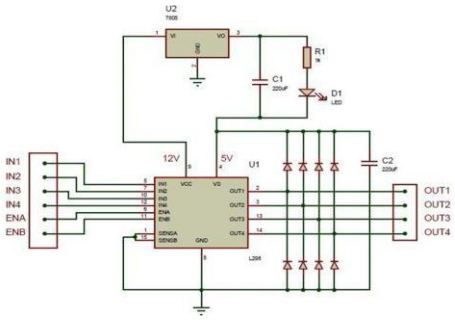

Fig 4 : Internal circuit diagram

The L298N is a dual H-bridge motor driver that simultaneously controls the speed and direction of rotation of two DC motors. This module can drive DC motors with voltages from 5V to 35V and peak currents up to 2A. Let's take a closer look at the pinout of the L298N module and explain it. The L298n motor driver module uses H-bridge technology to control the direction of rotation of a DC motor. In this method, the H-bridge controls the direction of rotation of the DC motor by reversing the polarity of the DC motor input voltage. The L298N is a high-voltage, high-current, dual full- bridge motor driver module for driving DC motors and stepper motors. Both the speed and direction of rotation of two DC motors can be controlled. This module consists of a dual channel H-bridge IC L298 motor driver. This module uses two methods to control the speed and direction of a DC motor. This is a PWM to control the speed and an H-bridge to control the direction of rotation. This module can drive 2 DC motors or 1 stepper motor simultaneously.

L298N Motor Driver IC

The L298 is a high voltage, high current dual fullbridge motor driver IC. Accepts standard TTL logic levels (control logic) to control inductive loads such as relays, solenoids, DC and stepper motors. It is a 15 pin IC. According to the L298 datasheet, its operating voltage is +5 to +46V and the maximum allowable current it can draw from each output is 3A.

Fig 5: L298N

Features and specifications:
Driver Chip: Dual H-Bridge L298N**Motor Supply Voltage (Max):** 46V**Motor Supply Current (Max):** 2A
Logic Voltage: 5V
Driver Voltage: 5-35V Driver
Current :2A Logic **current:** 0-36mA **Max power (W):** 25W
Current measurement for each motor Heat sink forbetter performance.

BLYNK APPLICATION

Blynk is an IoT platform for iOS or Android smart phones used to control Arduino, Raspberry Pi and NodeMCU over the internet. This application is used to create a GUI or Human Machine Interface (HMI) by compiling and providing appropriate addresses from available widgets. You can remotely control your equipment, display sensor data, save data, visualize it and do many other interesting things.

The platform consists of three major components.

The Blynk application - allows you to create amazing interfaces for your projects using the variety of widgets we offer.

Blynk Server - Responsible for all communication between the smartphone and the device. You can use the Blynk cloud or run your own personal Blynk server locally. It is open source and can easily work on thousands of devices and caneven run on the Raspberry Pi.
Blynk library - for all popular hardware platforms - provides communication with the server and handles all incoming and outgoing commands.
Now imagine - every time you press a button in the Blynk app, a message is sent to the Blynk Cloud and magically lands on your hardware. The same thing works in reverse and everythinghappens in the blink of an eye.

WORKING PRINCIPLE OF BLYNKAPPLICATION

Blynk uses the concept of "energy" to implement a pricing system for its widgets. You can start a new project with 1000 units of energy on the cloud server. An LED widget can cost 200 units, leaving 800 units for other widgets. You can set your own energy limit on your private server. You can set up your server to allocate 100,000 units of energy to new users. This is entirely up to you. Of course, additional energy units can be purchased and used for the Cloud Blynk servers, which is a reasonable consideration, especially if the users of the Blynk project are globally distributed (so latencyis not a big issue). However, Blynk's private servers offer additional benefits such as:

- Create any Blynk app you can think of with virtually unlimited powerunits.
- Minimum latency, which is useful when the application is used in a limited geographic area and responsiveness is important.
- Complete control over your data. You can keep your own backups of your personal server, move

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your server to a new host, implement whatever security mechanisms you want, and have precise control overyour users.

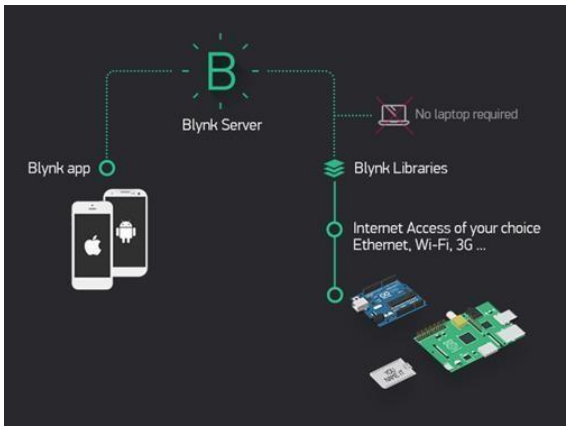

Fig 6 : Blynk Application

Fig 7 : Blynk Widget Interface

In the figure 7, this is the interface widget that we have created from the blynk application to control the seed sowing system. The up and down button are used to move

forward and backward. The left ,right button are used to turn the vehicle. Servo button is used to on and off the servo motor that we have fixed in the bottom of the funnel. The level detector is used to identify the capacity of the seed in the seed drum that was noted by the ultrasonic that was mounted on the top of the funnel.

BLOCK DIAGRAM :

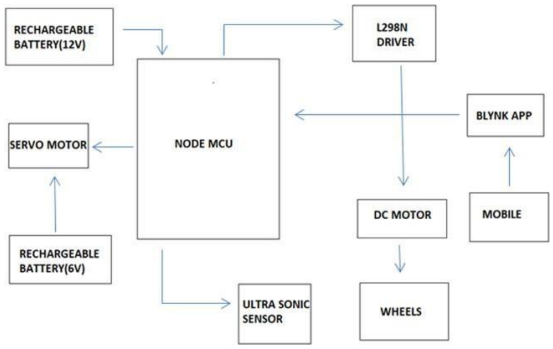

Fig 8: Block Diagram

The proposed model uses a battery for power. DC motors are placed on wheels for movement. The process of discharging the seeds from the seed drum and planting the seeds takes place without any loss of seeds. An ultrasonic sensor is also installed on the front panel for proper navigation when sowing the field. After completing each row, the seeds must be turned around to sow the second row. This is done with a sensor and controlled by the application detecting the end of the line. Traditionally, seeding is done in onerow only and must be manually moved to the secondrow. Adding sensors to this proposed model reduces human intervention. Control is performed using a Node MCU connected to the sensor. The DC motor is controlled by the L298N driver circuit. The seeding equipment is so efficient that it takes less time and less manpower. GSM modules are used to communicate with mobile phones and seedingsystems. The servomotor is then used to open and close the hopper in the seeding system. The seeding depth is correct, it does not slow down or accelerate plant growth, and the yield is the same. Seeds are sown in precise rows, planted accurately and yield very good food and economic growth. The DC motor used here is powered bya rechargeable battery, so the whole system is environmentally friendly.

FIGURE STRUCTURE

Fig: 9 – Shows that the full view of the module and the final implementation.
Fig: 10 – In this figure you will see the servo motor fixed in the bottom side of the funnel to control the seed flow from the seed drum.
Fig: **11** – The open shaft is used to clear the soil infront of the seed sowing system.
Fig: **12 –** The close shaft is used to close the soil after the seed felt in the soil.

APPLICATION, ADVANTAGES, DISADVANTAGE:

Application

1. Agriculture The construction of the narrow opener of the seed drill varies according to the soil conditions

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in each region. Most seed and fertilizer ballers are equipped with a pointed tool to create a narrow slot in the ground for seed placement.

2. Develop a seeding robot that can be controlled by IoT to sow seeds in the desired position, helping farmers save time and money. It is a machine that performs work such as sowing seeds for small-scale farmers.
3. Gardening Seeds are scattered on the ground, causing seed loss and damage. Seeds are expensive and not affordable for farmers, so seeds must be properly plantedin the soil.
4. It can be use for small scale farming.
5. It can be use in low water level places.

Advantage

1. Reduce the manual work Anyone that has ever had the task of relocating a fixed conveyor system knows that this can be a cumbersome undertaking. Through the use of this seed sowing system can be quickly reprogrammed to change path or operation, New directions, tasks, and work cells can be created almost instantaneously without the need for physical equipment installation.
2. Labor requirement reduces Optimization of transport flows in accordance with vehicle fleet, traffic and missions. Work flows distributed dynamically between the same.
3. Increased planting efficiency and Increased yield and crop safety.
4. Increased seeding speed.
5. The seeding process can be completed quickly with a limited number of farm workers.

Disadvantage

1. Electronics component cannot sustain the vibrations and the high temperature.
2. It is not suitable for high water level places.
3. Accuracy should be reduces due to clod and mud.

Final Implementations:

Fig 9: Side View

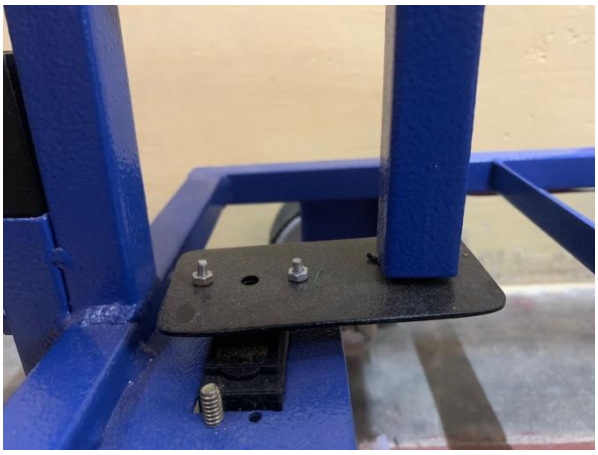

Fig 10: Servo motor

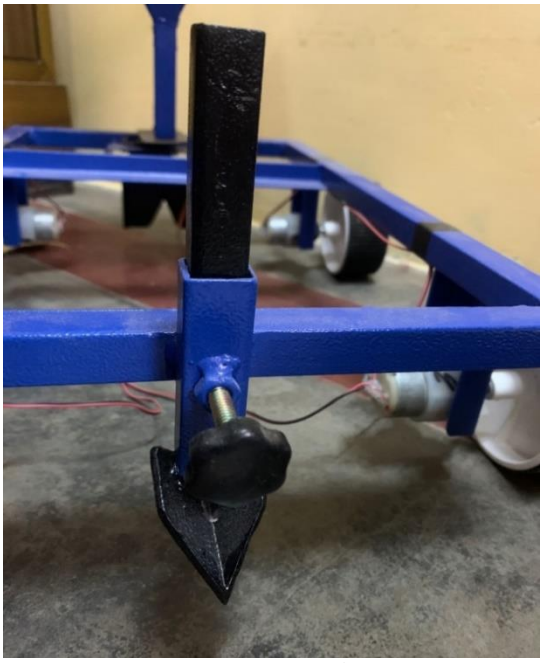

Fig 11: Open shaft

Fig 12: Close shaft

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CONCLUSION:

The main focus of this system is seeding. Seeds are sown in the correct order to ensure proper germination of the seeds. Seed losses are also significantly reduced here. This system is designed to sow seeds to reduce seed loss. Here, with the help of a seeding system, the seeds are distributed over the soil in the desired order. Sowing processes such as onions can be realized with seed sowing systems. This project will help farmers to carry out their agricultural processes effectively. The project can be extended to other crops such as fruit and rice. Systems can be designed with DC motors on wheels. Therefore, it can be applied to real-time agriculture.

Compliance with Ethical Standards:

Funding: This statement does not involve anyfunding.
Contact of interest: Mrs G.Preethi declares thatshe has no conflict of interest. R.Divyaprakash declares that he hos no conflict of interest.
L.Vettrisilaiuhan declares that hehas no conflict ofinterest.
S.Sanjay prabhu declares that he has no conflict of interest.
Ethical approval: This article does not contain anystudies with animals performed by any ofthe authors.
Ethical approval: This article does not contain any studies with human participiantsoranimals performed by any of the authors.

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