



Arduino Based Agriculture Robot

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ABSTRACT

India's economy is based primarily on agriculture. A third of India's total population has made agriculture their primary occupation. Agriculture is a major industry in states like Maharashtra, Punjab, Kerala, Assam, and Uttar Pradesh. It all began as a result of the "Green Revolution"'s influence, through which farmers learned about the various techniques involved in farming and its benefits. Due to the advancement of science over the centuries, some modern techniques in agriculture were created. Agriculturalists were able to produce better crops thanks to modernization. Today, every organization, in our eyes, must include robots. They contribute to lightening the load on humans. While human work frequently contains errors, electronic work is performed with exceptional precision. Therefore, for this project, we chose to design a better mechanical device that farmers could purchase for a lower price and that could also sow and seed the crop at the same time. In India's dry land regions, various models of seed sowing implements are becoming more and more popular due to the lack of sufficient farm labor and various agricultural implements.

I. LITERATURE REVIEW

The seed-sowing machine is discussed in this research paper. They outline the purpose of the machine's design for sowing seeds as well as some mechanisms and the factors that affect seed emergence. From this, we can infer that mechanical factors, such as uniformity of seed distribution along rows and uniformity of seed placement depth, have an impact on seed germination. Plunger mechanisms, seed meter mechanisms, etc. are all included in this power transmission system. A mechanism is employed. When the machine is pushed, the power wheel rotates, sending power through a chain and sprocket mechanism to the plunger. This gives us the idea that using a belt with small holes of a specific thickness is advantageous for our project. D. Ramesh as well as H. P. -DESIGN AND FABRICATION OF BANDING, says Girish Kumar.

SEEDING MACHINE.

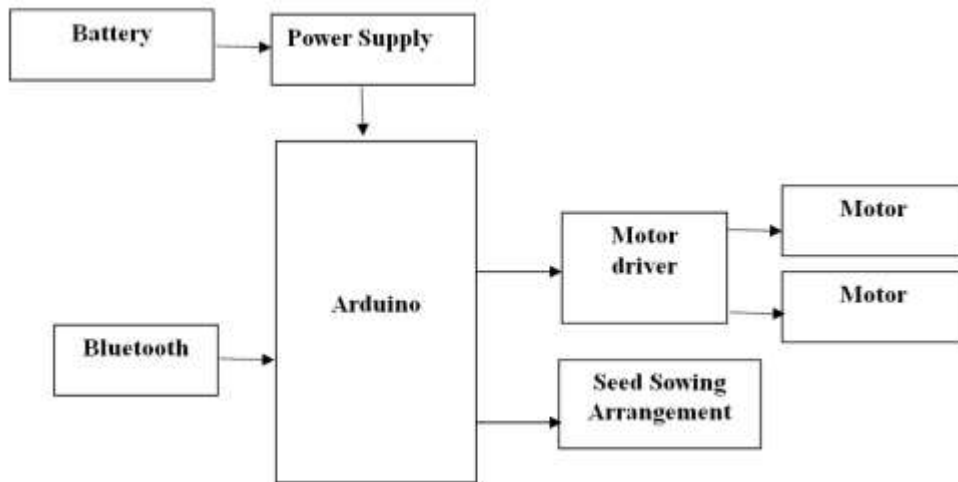
The main operation of a sowing prosee is to put the seed and fertilizer in line and seed-to-seed spacing, cover the seeds with soil, and provide proper compaction over the seed. The four wheel carrier assembly is where the container is fastened. Depending on the size of the seed, it has two holes at the bottom and a metering plate bevel gear mechanism. When the bottom holes of the container and the meter plate coincide, the working plate rotates in the container, allowing the seeds to flow through the pipe and into the soil. Here, the rotating motion of the metering plate is provided by a bevel gear assembly, and the bevel gears are moved by the rear wheels with the aid of a chain and sprocket assembly.

LKIP P. violent, etc. The procedure and machine design are presented in this paper. The primary goal of this essay is to simplify and facilitate farmers' seed-sowing processes. The machine has a straightforward design and is made in the region from lightweight materials. The main goal is to lower the cost for the farmers so they can manually complete their own work without relying on labor. The machine mentioned above improves seed sowing efficiency, decreasing seed waste and increasing overall yield.

A. Mahesh R. Pundkar and M. K. The machine's biggest benefit is that it is operated mechanically, manually, or without electricity. In comparison to earlier farming and crop cultivation techniques, this machine also takes considerably less time to operate.

Prenil V. Sawalakhe and others. This essay summarizes the machine's construction and methodology. The primary goal of this essay is to simplify and facilitate farmers' seed sowing. The machine is made locally with light materials and has a straightforward design. The primary goal is to reduce costs for farmers so they can perform all work manually on their own and not rely on labor. The aforementioned device improves the effectiveness of seed sowing, decreasing seed waste and increasing overall yield. .

Umed Ali Soomro, etc. Modern and traditional sowing techniques will be compared in this essay. The proposed machine is capable of achieving the necessary row-to-row spacing, seed rate, and seed-to-seed spacing. Human effort is decreased by the machine.

Block Diagram:**Battery:**

By running DC current through its terminals, a rechargeable battery can be put back to use after being discharged. A 12V battery [Model AT12-1.3] has been used.

Power supply:

The power supply is used to supply bias to the device and to change one form of energy into another. It does this by supplying bias to various parts of the device.

A USB connection or an external power source can be used to power an Arduino Uno. The power source is automatically chosen. Power from an AC-to-DC adapter (wall wart) or a battery can be used for external (non-USB) devices. The adapter can be connected by inserting a 2.1mm center-positive plug into the board's power jack. The Gnd and Vin pin headers of the POWER connector can accept battery leads. On an external supply ranging from 6 to 20 volts, the board can function. The board could become unstable if the 5V pin is supplied with less than 5V or less than 7V, though.

Utilizing more than 12V could cause the voltage regulator to overheat and harm the circuit board. The suggested range is 7 to 12 volts. The power pins look like this:

- **VIN:** The input voltage to the Arduino board when it is powered by an external source (instead of 5 volts from the USB connection or another type of regulated power source). Through this pin, you can access voltage or, if using the power jack to supply voltage, you can supply voltage.
- **5V:** The regulator on the board outputs a regulated 5V through this pin. The board can receive power from the USB connector (5V), the DC power jack (7–12V), or the board's VIN pin (7–12V). Bypassing the regulator by supplying power via the 5V or 3.3V pins can harm your board. We do not suggest it.
- **3V3:** supply of . A 3point 3 volts produced by the on-board regulator. The highest current draw is 50 mA
- **GND:** Ground pins.

Memory:

The bootloader uses 0 point 5 of the ATmega328's 32 KB of available memory. Additionally, it has 1 KB of EEPROM (which can be read and written with the EEPROM library) and 2 KB of SRAM.

Input and Output

The internal pull-up resistors on each pin range from 20 to 50 kOhm and have a 40 mA maximum current capacity by default. Some pins can be used in the following unusual ways, among others.

- **Serial:** (0 for RX) and (1 for TX). TTL serial data is transmitted and received using this device (RX and TX). The ATmega8U2 USB-to-TTL Serial chip's corresponding pins are connected to these pins.
- **External Interrupts:** On a low value, a rising or falling edge, or a change in value, these pins can be set to initiate an interrupt. For more information, refer to the attachInterrupt() function.
- **PWM:** Using the analog Write() function, an 8-bit PWM signal is produced.
- **SPI:** The SPI library supports SPI communication on these pins.

- **LED:** Connected to digital pin 13 is a built-in LED. Each of the Uno's six analog inputs, denoted by the letters A0 through A5, offers 10 bits of resolution (i.e. e. (1024 unique values). Although the upper limit of their measurement range can be altered using the AREF pin and the analogReference() function, they typically measure from ground to 5 volts by default. Some pins also have unique functions, such as:
- **TWI: A4 or SDA pin and A5 or SCL pin.** the Wire library should support TWI communication. There are a few additional pins on the board.
- **AREF** Analog inputs'. Reference voltage. when combined with analogReference().
- **Reset.** For the microcontroller to be reset, bring this line LOW. Shields that block the reset button on the board are frequently added with this feature. See also the ATmega328 port to Arduino pin mapping. The mapping is the same for the Atmega8, 168, and 328.
- **Arduino Uno**

The strength of the Arduino lies in its ability to communicate with the outside world via its input-output (I/O) pins, not in its ability to crunch code. The 14 digital I/O pins on the Arduino, numbered 0 to 13, can be used to read switch states, turn on and off motors and lights, and control other electronic devices. About 40 mA of current can be used to sink or source at each digital pin. This means that interface circuits are required to control devices other than straightforward LED lights, even though it is more than sufficient for interacting with the majority of devices. In other words, you cannot run a motor directly using the current supplied by an Arduino pin; instead, you must use the pin to drive an interface circuit, which then drives the motor. This document's later section demonstrates how to connect to a small motor. The program uses C code instructions to set digital pins to a high or low value, which corresponds to 5 V or 0 V at the pin, to communicate with the outside world. The device being turned on and off is connected to the pin via external interface electronics.

Servo Motor:

It is a machine that produces output voltage in proportion to the applied speed. Because we need to rotate the shaft to a specific angle, we use it for seed planting. Servo motors offer superb precision. They operate with a closed loop system. They are equipped with a feedback system that modifies the torque and velocity in response to the current and voltage being supplied. This system also alters the angle at which the seed is being plated.

DC Motor :

- The term "DdotC" refers to a device that transforms D.C power into mechanical power. motor. Its operation is based on the idea that a current-carrying conductor will experience a mechanical force when exposed to a magnetic field. Fleming's left hand rule provides the magnitude and direction of this force, respectively.
- The Newton's formula is $F = BIL$. In essence, there is no structural distinction between a DdotC. a motor and a DdotC. generator. identical D. C. It is possible to use a machine as a motor or generator.

BLUETOOTH:

Bluetooth .HHC-05 Bluetooth Module is one of the most cutting-edge and user-friendly wireless technologies. It communicates using serial communication, which is a convenient way to connect to a controller or piece.

L293d Motor Driver:

The typical motor driver, or motor driver IC, L293D, enables DC motors to drive in either direction. A 16-pin integrated circuit (IC) called L293D can simultaneously control two DC motors in any direction. Integrated circuit (IC) for dual H-bridge motor drivers.

Pin Number	Pin Name	Description
1	Enable 1,2	This pin enables the input pin Input 1(2) and Input 2(7)
2	Input 1	Directly controls the Output 1 pin. Controlled by digital circuits
3	Output 1	Connected to one end of Motor 1
4	Ground	Ground Ground pins are wired to the circuit's ground (0V).
5	Ground	Ground pins are connected to ground of circuit (0V)
6	Output 2	Connected to another end of Motor 1
7	Input 2	Directly controls the Output 2 pin. Controlled by digital circuits
8	Vcc2 (Vs)	Connected to Voltage pin for running motors (4.5V to 36V)
9	Enable 3,4	This pin enables the input pin Input 3(10) and Input 4(15)
10	Input 3	controls the Output 3 pin directly.
11	Output 3	Connected to one end of Motor 2
12	Ground	Ground pins are connected to ground of circuit (0V)
13	Ground	Ground pins are connected to ground of circuit (0V)
14	Output 4	Connected to another end of Motor 2
15	Input 4	directly manages the pin for Output 4.
16	Vcc2 (Vss)	Connected to +5V to enable IC function

WORKING PRINCIPLE :

Arduino will instruct the plate to choose the appropriate seed based on the user's input.

The speed will be determined after sowing. An Arduino's analog pins are connected to ultrasonic sensors. The purpose of using ultrasonic sensors is to continuously check the seed level and identify any potential obstacles. When an obstacle is detected, the machine will automatically stop and respond to any further user commands regarding which direction it should move. However, it will begin its sowing operation. The proposed system's operating principle, as shown in fig. 1. To start, it will dig up the ground while keeping a safe distance from the seed. After feeding, it will proceed to cover the seed with soil. If the user wants to change the seed, they only need to input commands through the application; the system will automatically adjust the speed of the plate and then the plate installed . below the hopper will move in accordance with the type of seed specified by the controller. This process will continue until the user issues a stop command through the Bluetooth commands dot. .Using a Bluetooth app, the device is managed. Fig. 1 shows a picture of the device. The Bluetooth device is crucial for sending commands to carry out operations. Its name is HC 05. This has a transmitter side and a receiver side, and the transmitter side is connected to the transmitted side of the Arduino. The Bluetooth terminal app is used to connect the Android application.



Fig : working

**Software Used:****Arduino IDE:**

The main website for writing, compiling, and uploading code to Arduino devices is Arduino . cc. With this open source program, which is simple to install and use to begin compiling code while on the go, almost all Arduino modules are compatible.

Advantages:

- The correct row spacing is preserved.
- The seeds can be planted at the correct depth. .
- The seeding rate is controllable. .
- The machine's compact size makes it convenient. .
- Effective in terms of costs. .

- Improve soil carbon sequestration for agriculture. .
- More precise. .
- Faster tempo. .
- Requires less manpower.

Applications:

- Seasoning with fixed separation and greater accuracy is done with it in agriculture. • It may also be used for agricultural purposes.

II. Conclusion

In this project, we attempted to find a solution to the issue that farmers deal with on a daily basis. We know that farmers' salaries are excessively high and that their output is lower after a full day of laboring on the farm. So, we created an automated robot that will assist farmers in the field. This prototype robot can provide high efficiency in production and their cultivation, taking into account the current situation. This robot can multitask, which saves a lot of time when farming manually. It has the ability to level the ground, spread fertilizer, and sow seeds. If a human were to perform the seeding and fertilizing, this project could be a more effective replacement. This project is very beneficial to farmers who want to engage in agriculture but are having trouble finding workers.

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