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**Research Paper**

# Automated Seed Sowing Robot

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***ABSTRACT***
*Agriculture is the backbone of Indian economy. About to third of the total population of India has chosen agriculture as their chief occupation. The states like Maharashtra, Punjab, and Kerala, Assam, Uttar Pradesh 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. As centuries passed, certain modern techniques were invented in agriculture due to the progress in science. With the help of modernization farmers were able to produce better crop.*
*Nowadays we see Robots as an integral part of every organization. They help in reducing the human load.Human work generally involves errors but the electronic work is done with great precision.*
*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.*
*This project consists of the better design of the machine which can be used specifically for sowing of soybean, maize, pigeon pea, Bengal gram, groundnut etc. For various agricultural implements and non-availability of sufficient farm labor, various models of seed sowing implements becoming popular in dry land regions of India.*

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## I. LITERATURE REVIEW

A. U. Malik and etc. This research paper presents seed sowing machine. In this they present objective of seed sowing machine design, factors affecting seed emergence, some mechanisms. The basic objective of sowing operation is to put the seed and fertilizer in rows at desired depth and seed to seed spacing, cover the seeds with soil and provide proper compaction over the seed. From this we know that mechanical factors effects on seed germination like uniformity of depth of placement of seed, uniformity of distribution of seed along rows. In this power transmission mechanism, seed meter mechanisms, plunger mechanism etc. mechanisms" are used. The working as machine is pushed; power wheel is rotating which transmit power to plunger through chain and sprocket mechanism. From this we get idea that if we use the belt having small holes with defined thickness then it is beneficial for or project.

D. Ramesh and H. P. Girish Kumar: -DESIGN AND FABRICATION OF BANDING AND SEEDINGMACHINE.The basic objective of sowing operation is to put the seed and fertilizer in rows at desired depth and seed to seed spacing, cover the seeds with soil and provide proper compaction over the seed. In this multipurpose seeding machine equipment consists of cylindrical shape container in which the seeds can fill. The container is attached on the four wheeled carrier assembly. It consists of metering plate bevel gear mechanism and two holes at the bottom depending on seed size. The working as plate will rotate in container when the bottom holes of container and meter plate hole coincide seeds will flow through pipe to soil. Here the metering plate gets rotating motion by bevel gear assembly and the bevel gears get the motion by rear wheels with the help chain and sprocket assembly.

Laukik P. Raut and etc. This paper represents the method used and the design of the machine. In this paper main objective is to make seed sowing simple and easy for the farmers. The design is simple and the machine is locally manufactured with light materials. The main objective is to make it affordable to the farmers so that they can manually do their own work without depending on labor. The above-mentioned machine increases the efficiency of seed sowing so there by reducing the wastage of seeds and thus improving overall yield.

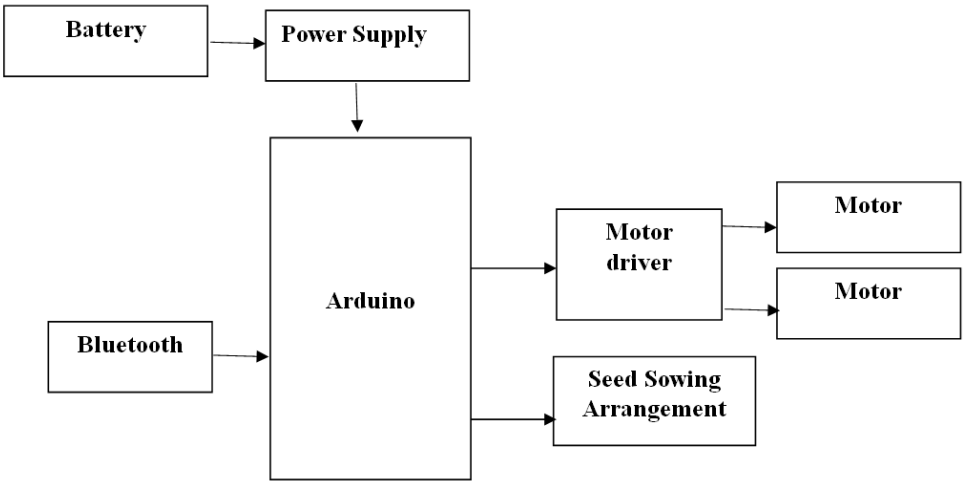
Mahesh R. Pundkar and A. K. Mahalle The seed sowing cum fertilizer drilling machine completes the task of soil drilling, seed sowing, fertilizer spreading and soil marinating as it proves itself for a multipurpose usage. The machine comes with its biggest advantage that it is a nonelectrical, manual or mechanically operated

machine. It is also a comparatively less time consuming machine than the previous methods used for farming and crops cultivation.

Pranil V. Sawalakhe and etc. This paper represents the method used and the design of the machine. In this paper main objective is to make seed sowing simple and easy for the farmers. The design is simple and the machine is locally manufactured with light materials. The main objective is to make it affordable to the farmers so that they can manually do their own work without depending on labor. The above mentioned machine increases the efficiency of seed sowing so there by reducing the wastage of seeds and thus improving overall yield.

Umed Ali Soomro and etc. The paper is to compare conventional sowing methods and modern methods. The required row to rowspacing, seed rate, seed to seed spacing can be achieved by proposed machine. The machine reduces the human efforts.

**Block Diagram:**




**Battery:**

A rechargeable battery is an energy storage device that can be charged again after being discharged by applying DC current to its terminals. We have used a 12V battery [Model AT12-1.3].

**Power supply:**

Power Supply is used to provide bias to the device, It converts one type of energy into another type . The power supply provides bias to various components.

The Arduino Uno can be powered via the USB connection or with an external power supply. The power source is selected automatically. External (non-USB) power can come either from an AC-to-DC adapter (wall-wart) or battery. The adapter can be connected by plugging a 2.1mm center-positive plug into the board's power jack. Leads from a battery can be inserted in the Gnd and Vin pin headers of the POWER connector. The board can operate on an external supply of 6 to 20 volts. If supplied with less than 7V, however, the 5V pin may supply less than five volts and the board may be unstable. If using more than 12V, the voltage regulator may overheat and damage the board. The recommended range is 7 to 12 volts. The power pins are as follows:

- **VIN**. The input voltage to the Arduino board when it's using an external power source (as opposed to 5 volts from the USB connection or other regulated power source). You can supply voltage through this pin, or, if supplying voltage via the power jack, access it through this pin.
- **5V.**This pin outputs a regulated 5V from the regulator on the board. The board can be supplied with power either from the DC power jack (7 - 12V), the USB connector (5V), or the VIN pin of the board (7-12V). Supplying voltage via the 5V or 3.3V pins bypasses the regulator, and can damage your board. We don't advise it.
- **3V3**. A 3.3 volt supply generated by the on-board regulator. Maximum current draw is 50 mA.
- **GND.** Ground pins.

**Memory:**

The ATmega328 has 32 KB (with 0.5 KB used for the bootloader). It also has 2 KB of SRAM and 1 KB of EEPROM (which can be read and written with the EEPROM library).

**Input and Output**

Each of the 14 digital pins on the Uno can be used as an input or output, using pinMode(), digitalWrite(), and digitalRead() functions. They operate at 5 volts. Each pin can provide or receive a maximum of 40 mA and has

an internal pull-up resistor (disconnected by default) of 20-50 kOhms. In addition, some pins have specialized functions:

- **Serial: 0 (RX) and 1 (TX).** Used to receive (RX) and transmit (TX) TTL serial data. These pins are connected to the corresponding pins of the ATmega8U2 USB-to-TTL Serial chip.
- **External Interrupts: 2 and 3.** These pins can be configured to trigger an interrupt on a low value, a rising or falling edge, or a change in value. See the attachInterrupt() function for details.
- **PWM: 3, 5, 6, 9, 10, and 11.** Provide 8-bit PWM output with the analogWrite() function.
- **SPI: 10 (SS), 11 (MOSI), 12 (MISO), 13 (SCK).** These pins support SPI communication using the SPI library.
- **LED: 13.** There is a built-in LED connected to digital pin 13. When the pin is HIGH value, the LED is on, when the pin is LOW, it's off.

The Uno has 6 analog inputs, labeled A0 through A5, each of which provide 10 bits of resolution (i.e. 1024 different values). By default they measure from ground to 5 volts, though is it possible to change the upper end of their range using the AREF pin and the analogReference() function. Additionally, some pins have specialized functionality:

- **TWI: A4 or SDA pin and A5 or SCL pin.** Support TWI communication using the Wire library.

There are a couple of other pins on the board:

- **AREF.** Reference voltage for the analog inputs. Used with analogReference().
- **Reset.** Bring this line LOW to reset the microcontroller**.** Typically used to add a reset button to shields which block the one on the board.

See also the mapping between Arduino pins and ATmega328 ports. The mapping for the Atmega8, 168, and 328 is identical.

**Arduino Uno**

The power of the Arduino is not its ability to crunch code, but rather its ability to interact with the outside world through its input-output (I/O) pins. The Arduino has 14 digital I/O pins labeled 0 to 13 that can be used to turn motors and lights on and off and read the state of switches. Each digital pin can sink or source about 40 mA of current. This is more than adequate for interfacing to most devices, but does mean that interface circuits are needed to control devices other than simple LED's. In other words, you cannot run a motor directly using the current available from an Arduino pin, but rather must have the pin drive an interface circuit that in turn drives the motor. A later section of this document shows how to interface to a small motor. To interact with the outside world, the program sets digital pins to a high or low value using C code instructions, which corresponds to +5 V or 0 V at the pin. The pin is connected to external interface electronics and then to the device being switched on and off.

**Servo Motor:**

It is a device that produces output voltage proportional to the applied speed. We use it for seed plantation because we want to rotate the shaft to a certainangle. Servo motors provide great precision. They work on closed loop system. They have a feedback system attached that constantly change the torque and velocity based on supplied current and voltage . While plating the seed it could change its angle .

**DC Motor**

- A machine that converts D.C power into mechanical power is known as a d.c. motor. Its operation is based on the principle that when a current carrying conductor is placed in a magnetic field, the conductor experiences a mechanical force. The direction of this force is given by Fleming's left hand rule and magnitude is given by;
- F = BIl newton's

Basically, there is no constructional difference between a D.C. motor and a D.C. generator. The same D.C. machine can be run as a generator or motor

**BLUETOOTH:**

One of the most advance and easy to use wireless technology is Bluetooth .HHC-05 Bluetooth Module used . It is a Bluetooth SPP (Serial Port Protocol) module, designed for transparent wireless serial connection setup. Its communication is via serial communication . Serial communication makes an easy way to interface with controller or PC.

**L293d Motor Driver:**

L293D is a typical Motor driver or Motor Driver IC which allows DC motor to drive on either direction. L293D is a 16-pin IC which can control a set of two DC motors simultaneously in any direction. It means that you can control two DC motor with a single L293D IC. Dual H-bridge Motor Driver integrated circuit (IC).

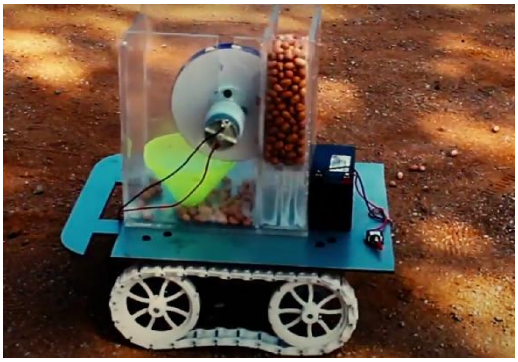
| Pin Number | Pin Name | Description |
|---|---|---|
| 1 | Enable 1,2 | This pin enables the input pin Input 1(2) and Input 2(7) |
| 2 | Input 1 | Directly controls the Output 1 pin. Controlled by digital circuits |
| 3 | Output 1 | Connected to one end of Motor 1 |
| 4 | Ground | Ground pins are connected to ground of circuit (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 | Directly controls the Output 3 pin. Controlled by digital circuits |
| 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 controls the Output 4 pin. Controlled by digital circuits |
| 16 | Vcc2 (Vss) | Connected to +5V to enable IC function |

**WORKING PRINCIPLE**

Input given by the user, Arduino will provide command to the plate to select an appropriate seed sowing and the speed will be set accordingly. Ultrasonic sensors are connected to the analog pins of an Arduino. Reason behind using ultrasonic sensors is to detect any obstacle present and to keep on monitoring the seed level. If any obstacle detected, the machine will stop automatically and the machine will respond as per the further command given user that in which direction the machine should move. Then again, it will start its operation of sowing. The working principle of proposed system as shown in fig.1. First it will dig up soil by maintaining distance to feed seed in soil.

After feeding it will move further so as to cover the seed by soil. This process will be continued till the stop command is not provided by the user through the Bluetooth commands . Suppose the user wants to change the seed we just to give input commands to system through application it will automatically change the speed of plate then the plate installed.below hopper will move according the type of seed instructed by the controller.

The device is controlled by Bluetooth App. Fig. 1 represents picture of device. The Bluetooth device is very much needed as to send the command for performing operations. The device is HC 05. The transmitter side of this is connected to the receiver side of the Arduino and the receiver side of this is connected to the transmitted side of Arduino. The Android Application is connected through the Bluetooth terminal app.



**Software Used:**

**Arduino IDE:**

**Arduino IDE** where IDE stands for Integrated Development Environment – An official software introduced by Arduino.cc, that is mainly used for writing, compiling and uploading the code in the Arduino Device. Almost all Arduino modules are compatible with this software that is an open source and is readily available to install and start compiling the code on the go.

**Advantages:**

- It maintains the proper row spacing.
- The seeds can be placed at proper depth.
- Seed rate can be controlled.
- Machine is convenient due to its small size.
- Cost efficient.
- Improve agricultural soil carbon sequestration.
- Higher Accuracy.
- Higher speed.
- Less Man-power require.

**Applications:**

- It is used in farming for seed sowing with fixed separation & more accuracy.
- It can also use for cultivating purpose.

## II. Conclusion

In this project we tried to overcome the problem of farmers which they face in day-to-day life. Since we know that wages of farmers are too high, and after spending their whole day in the farm land their production is found less. So, we had made an automated robot which will be a helping hand to the farmers in field. Observing the current scenario this prototype robot can provide high efficiency in production and their cultivation. This robot can do multitasking which is lots of time consuming when done by manual-based method farming. It can sow seed, spray fertilizers and also levelling of the surface. This project can be a better substitute for the human who performs the seeding and fertilizing. This project is very useful for the farmers who are intended to do agriculture activity but facing the labor problem.

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