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Automated Seed Sowing Robot

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Abstract: *The automated seed-sowing robot is an innovative agricultural technology designed to revolutionize the process of planting seeds. With a compact and efficient design, this robot aims to increase efficiency and precision in agricultural practices while reducing labor requirements.Equipped with advanced sensors and intelligent algorithms, the robot is capable of accurately identifying suitable planting locations based on soil conditions, sunlight exposure, and other environmental factors. It autonomously navigates the field, using its robotic arm to plant seeds at optimal depths and spacing, ensuring uniform distribution for optimal plant growth. The robot's automated capabilities extend beyond planting. It can also monitor and adjust its actions in real-time, responding to changing weather conditions or variations in soil quality. Additionally, the robot is programmed to avoid obstacles and operate safely in the field, minimizing the risk of damage or accidents. By replacing manual labor, the automated seed-sowing robot streamlines the planting process, saving time and resources for farmers. Its precision planting capabilities contribute to higher crop yields and improved agricultural productivity. With this technology, farmers can embrace sustainable farming practices and enhance food production to meet the growing global demand.*

Keywords: seed-sowing robot

I. INTRODUCTION

Agriculture has been the backbone of the Indian frugality and it'll continue to remain so for a long time. moment the environmental influence of agrarian product is veritably important in focus and the demands to the assiduity is adding . In the present script, utmost of the metropolises in India don't have sufficient professed man power in agrarian sector and that affects the progress of developing country. thus, growers have to use upgraded technology for civilization exertion.

The automated seed sowing robot using Arduino Mega is a groundbreaking innovation that revolutionizes the agricultural industry. Designed to streamline the tedious and time-consuming task of seed sowing, this robot combines the power of robotics and advanced electronics. With its compact design and intelligent programming, it offers a highly efficient and precise solution for farmers.

The Arduino Mega microcontroller serves as the brain of the robot, enabling it to execute complex algorithms and control various components. Equipped with sensors and actuators, the robot can accurately detect soil conditions and dispense seeds accordingly. It autonomously navigates the field, following pre-defined paths or utilizing GPS technology for optimal coverage.

This cutting-edge technology offers several advantages, such as increased productivity, reduced labor costs, and improved seed placement accuracy. By eliminating human error and ensuring uniform seed distribution, the robot promotes optimal plant growth and crop yield. Moreover, it can be customized to accommodate different seed types and field sizes, making it adaptable to various farming needs.

II. LITERATURE REVIEW

The development of IoT-based smart security and monitoring devices has transformed the agricultural industry, enabling farmers to remotely monitor and manage their farms effectively. The study demonstrated that WSN-based irrigation systems provide real-time data for efficient water management, resulting in water conservation and enhanced crop production.The use of WSN in irrigation systems has gained significant attention due to its potential to optimize water usage and improve crop yield.Wi-Fi robot integrated systems offer remote monitoring and surveillance

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capabilities for agricultural applications. A study by Wang et al. proposed a design and operation framework for a Wi-Fi robot integrated system, enabling farmers to remotely control and monitor their fields.

III. METHODOLOGY

The techniques used in this work consist of designing the circuit diagrams for the system and development of the necessary firmware for the prototype of window. The system block diagram is shown in Figure and main components: Arduino Mega,Bluetooth HC-05 Sensor,L293d Module,Single Channel Relayand power supply unit.

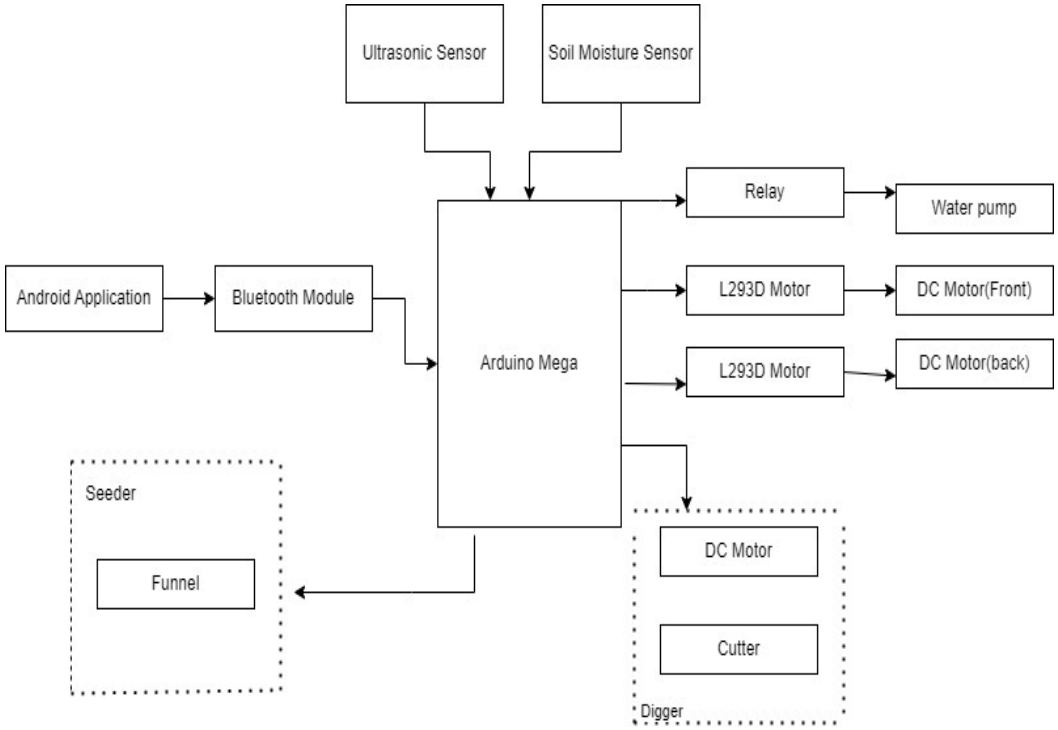

Fig. Working block diagram of system

IV. HARDWARE COMPONENTS

4.1ATMEGA328micro controller

The ATmega328 is an 8-bit micro controller from the AVR family. It operates at a clock speed of up to 20 MHz, has 32KB of flash memory, 2KB of SRAM, and 1KB of EEPROM. It is widely used in various applications, including Arduino boards, due to its versatility and affordability.

4.2 HMC5883L Compass sensor

The HMC5883L is a 3-axis digital compass sensor. It uses the magneto resistive effect to measure the Earth's magnetic field. With a small form factor and low power consumption, it provides accurate heading information in various applications. The sensor has a built-in 12-bit ADC, offering a resolution of 0.1 degrees. It communicates via I2C, making it easy to integrate into microcontroller projects. It is commonly used in robotics, navigation systems, and electronic compasses for its reliable performance.

4.3 Ultrasonic sensor

An ultrasonic sensor is a device that uses sound waves to measure distances and detect objects. It emits high-frequency sound pulses and measures the time it takes for the pulses to bounce back after hitting an object. This information is used to calculate the distance. Ultrasonic sensors are widely used in robotics, automation, and security systems due to their non-contact nature, accuracy, and ability to work in various environments.

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4.4 Soil moisture sensor

A soil moisture sensor is a device used to measure the moisture content of soil. It helps monitor and control irrigation in agricultural and gardening applications. These sensors typically consist of two or more electrodes inserted into the soil. By measuring the electrical conductivity or capacitance between the electrodes, they can determine the moisture level. This information is crucial for optimizing water usage, preventing over watering or under watering, and promoting healthy plant growth. Soil moisture sensors are widely used in precision agriculture and automated irrigation systems.

4.5 DC Motor

A DC motor is an electrical device that converts direct current (DC) electrical energy into mechanical motion. It consists of a stater (stationary part) and a rotor (rotating part). When current flows through the motor, it creates a magnetic field that interacts with the magnetic field of the rotor, causing it to rotate. DC motors are commonly used in a wide range of applications, including robotics, industrial machinery, electric vehicles, and home appliances, due to their simplicity, contractility, and versatility.

4.6 Power Supply

A power supply is an electrical apparatus that transforms the input voltage from a source like a wall outlet or battery into the precise voltage and current needed to operate electronic devices. Its role is to deliver a steady and controlled power output, ensuring the reliable and efficient operation of connected components. Power supplies are crucial for providing power to a wide range of devices and systems, including micro controllers, sensors, motors, and electronic circuits.

V. SOFTWARE IMPLEMENTATION

5.1 Arduino IDE

The Arduino IDE (Integrated Development Environment) is a software tool specifically designed for programming Arduino boards. It offers a user-friendly interface that enables users to write and upload code to Arduino micro controllers. The Arduino IDE supports the Arduino programming language, which is derived from Wiring. It provides a simplified environment that is particularly beneficial for beginners who are starting to learn programming and controlling Arduino boards. The IDE incorporates features such as code editing, compiling, uploading, and serial communication. These functionalities make it an indispensable tool for Arduino-based projects and prototyping.

5.2 Proteus 8 Professional

Proteus 8 is a software tool used for electronic circuit design, simulation, and testing. It offers a comprehensive set of features for designing and simulating circuits, including schematic capture, component libraries, and virtual testing of circuits. Proteus 8 allows users to analyse and verify the functionality of their electronic designs before physically implementing them, reducing time and costs associated with prototyping and testing. It is widely used by engineers, educators, and hobbyists in the field of electronics.

VI. CIRCUIT DESIGN

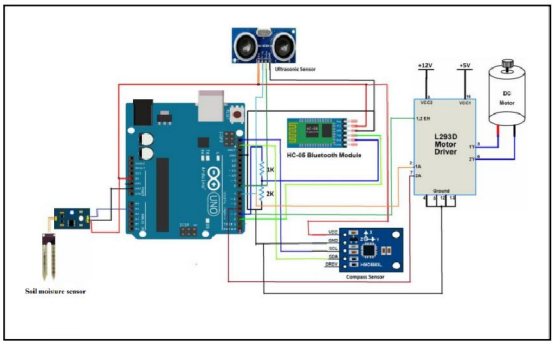

Fig.8.1 Circuit Diagram

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VII. RESULT

- The system architecture involved integrating a micro-controller with a Bluetooth module .
- The Arduino Meg's capabilities enable the robot to record and store data during the seed sowing process.
- The robot ensures precise and accurate seed placement, resulting in consistent spacing and depth, leading to optimal plant growth and yield.
- The automated seed sowing robot utilizing Arduino Mega significantly improves the efficiency of the seed sowing process by eliminating the need for manual labor and reducing human error.

VIII. CONCLUSION

Automated seed sowing robot will be designed trope form the complex farming tasks like seed sowing, grass cutting and pesticide spraying. This work is designed trope form sowing of two different sized seeds. The benefits of robot are reduced human intervention and efficient resources utilization. Instructions are passed to the system using Bluetooth which ensures no direct contact with human and thus safety of operator is ensured. The operations are performed using android app. Innovative seed sowing, grass cutting and has significant influence in agriculture. By using this advanced work, farmer can save more time and also reduce lot of labour cost. The farming process, often used conventional seeding operation takes more time and more labour. The seed feed rate is more but the time required for the total operation is more and the total cost is increased due to labour, hiring of equipment. The conventional seed sowing machine is less efficient, time consuming. Today's era is marching towards the rapid growth of all sectors including the agricultural sector. To meet the future food demands, the farmers have to implement the new techniques which will not affect the soil texture but will increase the overall crop production.

IX. FUTURE SCOPE

1. Integration with Smart agriculture System.
2. Integration with Renewable Energy Sources
3. Using remote control machine can be made automatic.
4. Addition of multi-hopper can be attached side by side for sowing of large farm.

REFERENCES

[1]. K. Shaik, E. Prajwal, S. B, M. Bonu and V. R. Balapanuri, "GPS Based Autonomous Agricultural Robot," 2018 International Conference on Design Innovations for 3Cs Compute Communicate Control(ICDI3C*)*,Bangalore, 2018.

[2]. Tanmay Baranwal, Nitika, Pushpendra Kumar Pateriya "Development of IoT based smart security andMonitoringDevicesforAgriculture",CloudSystemandBigDataEngineering(Confluence),6thInternationalConferenceon, 2016.

A. Satya, B. Arthi, S. Giridharan, M. Karvendan, J. Kishore "Automatic control of irrigation system inpaddy using WSN", Technological Innovations in ICT for Agriculture and Rural Development (TIAR),2016.

[3]. G. Amer, S. M. M. Mudassir and M. A. Malik, "Design and operation of Wi-Fi agribot integratedsystem,"2015InternationalConferenceonIndustrial Instrumentationand Control(ICIC),Pune,2015.

[4]. Nagdeve, P. Jangde, H. Tandulkar, S. Dhara, N. Ukani and S. Chakole(2020), "Solar-powered Android based Speed Control of DC motors throughSecureBluetooth"BombaySection Symposium (IBSS), 2015.

[5]. M. Usha Rani and S. Kamalesh, "Web based service to monitor automatic irrigation system for theagriculture field using sensors," 2014 International Conference on Advances in Electrical Engineering(ICAEE),Vellore, 2014.

[6]. Aravind Kumar, Akkarapalli sanjeev Reddy, k. Sagathevan."Automatic seed sowing and irrigation agriculture robot(2021)

[7]. Emerging technology and Computer Science, Volume: 01, Issue: 01, February 2016.

[8]. Calvin Hung, Juan Nieto, Zachary Taylor, JamesUnderwood and Salah Sukkarieh, "Orchard FruitSegmentation using Multi-spectral

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[9]. Feature Learning", IEE/RSJ International Conference on Intelligent Robot System Tokyo, Japan,3-7, November 2013.

[10]. P. Giftson Paul , B. Jyothir Risheek , Y. Sharan Kumar, M. R. Mahalakshmi , L. Jiban Priya"Solar Controlled Unmanned SeedSowing Robot **"**(2021)

[11]. Jaya Krishna P V.S. Suryavamsi Reddy Jaswant Sai N"Autonomous Seed Sowing Agricultural Robot."(2021)

[12]. Nitave Ranjit, Waghamode Harshad ,"solar seed sowing machine "ISSN 0973-4562 Volume 13, Number 6 (2018)

[13]. Pankaj Kumar , G. Ashok , M.A.Malik"Design and fabrication of smart seed sowing robot "(2015)