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Sowing Seed AG-Robot Using Ardunio

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ABSTRACT
The Internet of Things (IoT) is a rapidly growing field that presents numerous opportunities for final year project research. IoT involves the connection of physical devices, sensors, and machines to the internet, enabling them to collect and exchange data. The goal of many IoT projects is to improve efficiency, enhance safety and security, and create new solutions for everyday problems.There are several potential areas of research. One possibility is to develop an IoT-enabled system for a specific application, such as a smart home automation system or a smart irrigation system for agriculture. This would involve selecting appropriate sensors and devices, developing software to collect and analyze data, and integrating the system with other components.Another potential area of research is to focus on the development of IoT-enabled wearables, such as smart watches or fitness trackers. This would involve developing sensors to collect data on various metrics, such as heart rate, activity levels, or sleep patterns, and developing software to analyze the data and provide insights to users.A final area of research could be to explore the security and privacy implications of IoT systems. This could involve developing methods to secure data transmission, protecting against cyber-attacks and data breaches, and ensuring user privacy is protected.

KEYWORDS

Internet of Things (IoT),Sowing seed robot,Agriculture automation,Ultrasonic-sensor,Precision farming,Soil,moisture sensor,Remote monitoring and control, Arduino technology.

INTRODUCTION
The Internet of Things (IoT) is a rapidly growing network of devices, sensors, and software that enables communication and data exchange between physical objects. It has the potential to revolutionize various industries, including agriculture. In this project, we propose an IoT-based seed sowing robot that can automate the process of planting seeds in farms, using Arduino technology.The robot is equipped with sensors that can detect soil moisture levels to determine the optimal planting conditions. These sensors are connected to an Arduino microcontroller, which controls the movement of the robot and adjusts the depth and spacing of the seeds based on the collected data. The robot can also be remotely controlled and monitored via a mobile application, providing farmers with real-time information on the planting process.

The use of IoT technology in agriculture can lead to improved crop yield and reduced labor costs. By automating the process of seed sowing, farmers can save time and focus on other tasks, such as irrigation and pest control. Additionally, the data collected by the robot's sensors can be used to optimize crop growth and reduce water and fertilizer usage, leading to more sustainable farming practices.

The proposed IoT-based seed sowing robot using Arduino technology has the potential to revolutionize agriculture by increasing efficiency, reducing labor costs, and improving crop yields. As the technology continues to evolve, we can expect to see more innovative applications of IoT in agriculture that will further improve the sustainability and productivity of farming practices.

Agriculture has been the backbone of the Indian economy and it will continue to remain so for a long time. Today the environmental influence of agricultural production is very much in focus and the demands to the industry is increasing. In the present scenario, most of the cities in India do not have sufficient skilled man power in agricultural sector and that affects the progress of developing country. Therefore, farmers have to use upgraded technology for cultivation activity.

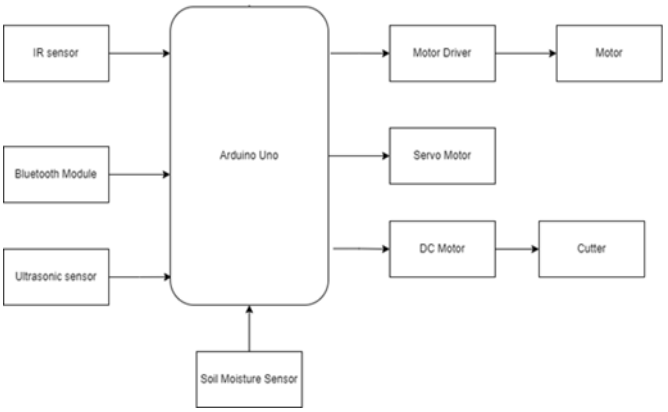
Manual method includes broadcasting the seeds and fertilizers by hand. So it’s time to automate the sector to overcome these problems. Innovative idea of this

project is doing the processes like verifying if the soil is suitable for cultivation, seed sowing, covering the land and spraying fertilizers automatically so that human efforts will get reduced. The system will be utilized for sensing, monitoring, controlling and for communication purpose.

Different sensors are used to detect parameters like soil moisture and obstacle detection. Depending upon the sensors output the microcontroller will take the necessary actions. The moisture sensor output will help to determine if the soil is suitable for cultivation. Once the soil is suitable, the seed sowing operation can be performed. The operation of robot can be controlled using an Android application.

LITERATURE SURVEY

Sr. No	Title of the Paper	Year of publication	Published	Description
1.	Developmentof IoT based smart security and Monitoring Devices for Agriculture	2016	Tanmay Baranwal, Nitika, Pushpendra Kumar Pateriya	An IOT device was designed and tested which is capable of analyzing sensed information and transmitting it to user. Based on testcases, 84.8% success was achieved.
2.	Automatic control of irrigation system in paddy usingWSN	2016	Satya, Arthi, S. Giridharan,M.Karvendan, J. Kishore	The system automatically irrigates the field through the entrance valve when the water level is lower thanthe threshold leveland also accordingto the moisture of the soil.
3.	Design and Operation of Wi-Fi Robot Integrated system	2015	G.Amer, S.M.M Mudassir, M.A.Malik	The walking algorithm allows it to instantly changedirection and walkin any new direction without turning its body. An under body sensory array allows the robot toknow if a seed hasbeen planted in the area at the optimal spacing and depth.
4.	Solar- powered Android based Speed Control of DC motors through Secure Bluetooth	2014	Abhishekh Khanna, Priya Ranjan	The smartphone sends/receives datamicrocontroller using Bluetooth. Display of motor position using sensors can be sentby microcontrollerto the smartphone.
5.	Web basedservice to monitor automatic irrigation system for agriculture field using sensors	2014	M.Usha Rani,S.Kamalesh	When particularmoisture level isreached, water flow is allowed and pressure is updated in database.



HARDWARE COMPONENTS:

1. ARDUINO MEGA: It is the main controller for the robot. The Arduino Mega is a microcontroller board based on the ATmega2560. It has 54 digital input/output pins, 16 analog inputs, 4 UARTs (hardware serial ports), a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button.
2. DC MOTORS: The robot uses four DC motors to move. The motors are controlled by the Arduino Mega through an H-bridge motor driver.
3. SOIL MOISTURE SENSORE: The soil moisture sensor is used to measure the amount of moisture present in the soil. It is used to determine whether the soil is dry or wet. The sensor has two probes that are inserted into the soil to measure the moisture content.
4. RELAY: The relay is used to control the water pump. The relay is connected to the Arduino Mega and is used to switch the water pump on and off.
5. HC05 BLUETOOTH MODULE: The HC05 Bluetooth module is used to communicate wirelessly with the robot. It is connected to the Arduino Mega and allows the robot to be controlled remotely.
6. WATER PUMP: The water pump is used to water the plants. It is controlled by the relay and is turned on and off depending on the moisture content of the soil.
7. ATMEGA326: The Atmega 326 is a microcontroller that is used to control the sowing mechanism. It is connected to the Arduino Mega and is used to control the depth of the seeds sowed.

SOFTWARE COMPONENTS:

1.ARDUINO IDE: The Arduino Integrated Development Environment (IDE) is used to program the Arduino Mega. It is an open-source software that is used to write and upload code to the Arduino board.
2. C/C++ Programming Language: The programming language used to develop the code for the Arduino Mega is C/C++. It is a high-level programming language that is commonly used for embedded systems.

PROPOSED WORK PLAN

1. Hardware assembly: Assemble the hardware components required for the robot, including the chassis, ultrasonic sensor, DC motors, relay, HC05 Bluetooth module, ATmega 328 microcontroller, soil moisture sensor, and water pump. Connect the components to the Arduino Mega board, ensuring that the connections are secure and that the robot is properly grounded.
2. Motor control: Program the Arduino Mega to control the movement of the robot using the 4 DC motors. The robot should be able to move forward, backward, and turn left or right. Test the motor control and adjust the programming as necessary.
4. Ultrasonic sensor integration: Integrate the ultrasonic sensor into the robot and program the Arduino Mega to use the sensor to detect obstacles in the robot's path. This will ensure that the robot can navigate through the farm without getting stuck or damaging crops.
5. Soil moisture sensor integration: Integrate the soil moisture sensor into the robot and program the Arduino Mega to use the sensor to measure the moisture level of the soil. This will enable the robot to determine the optimal planting conditions.
6. Water pump integration: Integrate the water pump into the robot and program the Arduino Mega to use the pump to irrigate the soil when necessary. This will help ensure that the plants receive the necessary water and nutrients for optimal growth.
7. Bluetooth communication: Program the Arduino Mega to communicate with the HC05 Bluetooth module, enabling farmers to remotely control and monitor the robot using a mobile application. This will allow farmers to adjust the planting parameters and monitor the planting process in real-time.
8. Testing and optimization: Test the robot in a farm setting and make any necessary adjustments to the programming or hardware components to optimize performance. Monitor the robot's performance over time and make any necessary updates to ensure that it continues to operate effectively.

the proposed work plan outlines the key steps involved in developing a seed sowing robot using Arduino Mega, ultrasonic sensor, 4 DC motors, relay, HC05 Bluetooth module, ATmega 328,soil moisture sensor, and 1 water pump. The resulting robot will automate the process of planting seeds in farms, enabling farmers to save time and improve crop yields.

ALGORITHM OF SOWING SEED OPERATION

[1].Start the robot by powering it up.
[2].Configure the Android application on the smart phone and select the seed sowing option. Then this command will be sent to the robot.
[3].Now first read the output of the soil moisture sensor. Verify if the soil is suitable for cultivation of the required crop. If the soil is not suitable then stop the further operation and if the soil is suitable then continue with further operation. When the sensor is inserted into the soil, the resistance will decrease and get better conductivity between plates. Here we will be using this sensor to verify if the soil contains appropriate moisture content for the growing of crops: wheat, jowar and sunflower.
[4].Once the soil suitability is verified then check the output of the ultrasonic sensor. Here, this sensor is used to detect if any obstacle is present in the path of the robot. The Ultrasonic transmitter transmits an ultrasonic wave, this wave travels in air and when it gets objected by any material it gets reflected back toward the sensor this reflected wave is observed by the Ultrasonic receiver module. If any obstacle is encountered then set the directions using the compass sensor and if not then continue.
[5].Now, perform the digging operation using drill bit. Here, for the crops specified the depth is 5cm. So using the drill bit dig the soil up to 5cm. After the digging is done, drop the seeds of the crop in the dug holes.
[6].After dropping is done move forward. The directions of the robot are controlled using the compass sensor.
[7].If the farm ends then stop or else continue from step 5 to 10.

CONCLUSION

In conclusion, the sowing seed ag robot using Arduino Mega is an innovative application of IoT technology in agriculture. The robot's ability to automate the process of planting seeds can help farmers save time, reduce labor costs, and improve crop yield by optimizing planting conditions.
The integration of various sensors, including soil moisture, temperature, and pH sensors, allows the robot to adapt to changing environmental conditions and optimize planting conditions. The use of an Arduino Mega microcontroller as the control center enables remote monitoring and control, providing farmers with real-time data on the planting process and allowing them to adjust the robot's movement and planting parameters.
The sowing seed ag-robot using Arduino Mega can help farmers adopt more sustainable farming practices by reducing water and fertilizer usage while increasing crop yield. The use of automation in agriculture also helps address labor shortages in rural areas, which is becoming an increasingly important issue.
Overall, the sowing seed ag-robot using Arduino Mega is a promising development in precision farming and can help pave the way for more innovative applications of IoT technology in agriculture. As the technology continues to evolve, we can expect to see more advanced and efficient ag robots that will further enhance the sustainability and productivity of farming practices.

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