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SMART SEEDING ROBOT USING IOT

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ABSTRACT

In India, Agriculture is the main sector occupation for more than 60% of the population. Due to the growing workforce shortage, interest in developing autonomous vehicles like robots for agriculture

Robot named Agrobot has been created specifically for farming. It is intended to reduce the amount of work farmers have to do while also accelerating and improving the quality of the job. It works on the basic tasks, such as spraying water, planting seeds, and so forth, all at once. For the safety and health of the workers, spraying is particularly crucial in potentially hazardous areas. The proposed system aims to create a versatile, autonomous agricultural robotic car that can be operated via the internet of things to spray water and plant seeds. These Robots are used to ensure high yield, minimize human intervention, and save time. It can be used for small fields. The system will consist of soil moisture sensors connected to a microcontroller. The microcontroller will be connected to a motor that will control the seed sowing mechanism and a water pump that will control the water spraying Mechanism. The user able to set the desired seed density and watering frequency using a mobile app. This app also display real-time data on soil moisture conditions, and the status of the seed sowing and watering process. The main motive of this project is to optimize the seed sowing and watering process and reduce water wastage. This will result in increased crop yield and reduced water usage.

Key words: DC water pump, Microcontroller, Smart phone, Battery, Relay.

OBJECTIVES

The device is intended for use in farming tasks that require several operations, such as ploughing, seed sowing, watering, and pesticide spraying. The principal goals of this device are,

1. To fabricate an economically effective agricultural machine that reduces the man strength.
2. Its goal is to assist tiny and medium-sized farmers, which will reduce the expense and labour.
3. To shorten the workday.
4. To create a portable, light-weight system.
5. To finish a lot of labour in a short period of time.

1.2 INTRODUCTION TO SMART SEEDING AND SPRAYING

In some regions of Southern India, agriculture has existed since the Indus Valley Civilization era. India currently comes in second place globally for farm production. Specialized vehicles are extremely important in a variety of areas, industrial, medical, and military applications, etc. The productivity of the special vehicle industry in the agricultural sector is steadily rising. Rising input costs, a lack of skilled labour, a lack of water resources, and crop monitoring are some of the main issues facing Indian agriculture. The automation methods were applied in agriculture to solve these issues.Automation may enable producers to exert less effort.

Vehicles are being created for the weeding, seeding, leveling, and water spraying procedures. One model has not yet been used for all of these tasks. In this, the machines are designed to focus effectively and are anticipated to carry out the tasks on their own. The suggested solution uses a vehicle to carry out tasks like plowing, sowing seeds, leveling mud, and spraying water. These tasks can be carried out by integrating them into a singular vehicle.

Agriculture is the practice of growing food and producing products through forestry and farming. The cultivation of domesticated animals and plants (i.e., crops) produced food surpluses that allowed the emergence of more stratified and densely populated communities, which was the crucial development that sparked the rise of civilization. Agricultural science is the study of crops.

India currently places second globally in agricultural output. Agriculture and allied sectors like forestry, logging and fishing accounted for 16.6% of the GDP in 2007, employed 60% of the total workforce and despite a steady decline of its share in the GDP, is still the largest economic sector and plays a significant role in the overall socio-economic development of India.

PROBLEM IDENTIFICATION

Slow agricultural growth is a concern for policymakers as some two-thirds of India’s people depend on rural employment for a living. Current agricultural practices are neither economically nor environmentally sustainable and India's yields for many agricultural commodities are low. Poorly maintained irrigation systems and almost universal lack of good extension services are among the factors responsible. Farmers' access to markets is hampered by poor roads, rudimentary market infrastructure, and excessive regulation.

Water Management

Efficient water management is critical in agriculture, especially in regions facing water scarcity. The sector requires innovative solutions to optimize irrigation techniques, reduce water wastage, and promote sustainable water use practices.

Labour Shortages

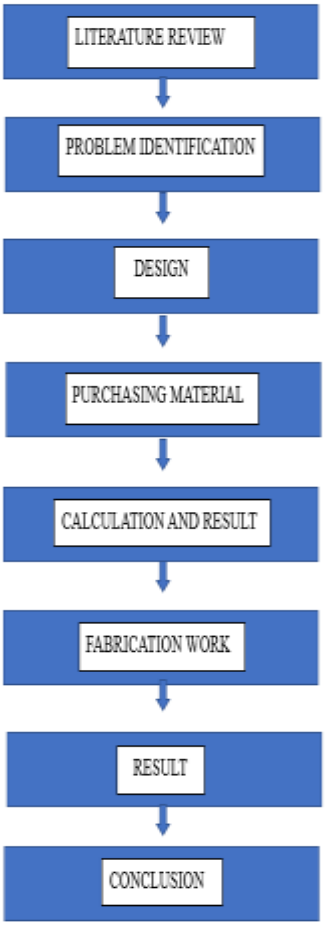
In many regions, agriculture faces a shortage of skilled labour, particularly for labour-intensive tasks like planting, weeding, and harvesting. The aging agricultural workforce and rural-to-urban migration pose challenges to farm operations.

Access to Technology and Information

Many small-scale farmers, particularly in developing regions, lack access to modern agricultural technologies, information, and resources. Bridging the digital divide and providing farmers with access to appropriate tools and knowledge can help improve agricultural practices and productivity.

WORKING METHODOLOGY

FLOW CHART



Flow chart

CONTROL UNIT

Microcontrollers are destined to play an increasingly important role in revolutionizing various industries and influencing our day to day life more strongly than one can imagine. Since its emergence in the early 1980's the microcontroller has been recognized as a general purpose building block for intelligent digital systems. It is finding using diverse area, starting from simple children's toys to highly complex spacecraft. Because of its versatility and many advantages, the application domain has spread in all conceivable directions, making it

ubiquitous. As a consequence, it has generate a great deal of interest and enthusiasm among students, teachers and practicing engineers, creating an acute education need for imparting the knowledge of microcontroller based system design and development.

5.7 BLYNK APP

Blynk was designed for the Internet of Things. It can control hardware remotely, it can display sensor data, it can store data, visualize it and do many other cool things. There are three major components in the platform:

- **Blynk App** - allows to you create amazing interfaces for your projects using various widgets we provide.
- **Blynk Server** - responsible for all the communications between the smartphone and hardware. You can use our Blynk Cloud or run your private Blynk server locally. It's open-source, could easily handle thousands of devices and can even be launched on a Raspberry Pi.
- **Blynk Libraries** - for all the popular hardware platforms - enable communication with the server and process all the incoming and out coming commands.

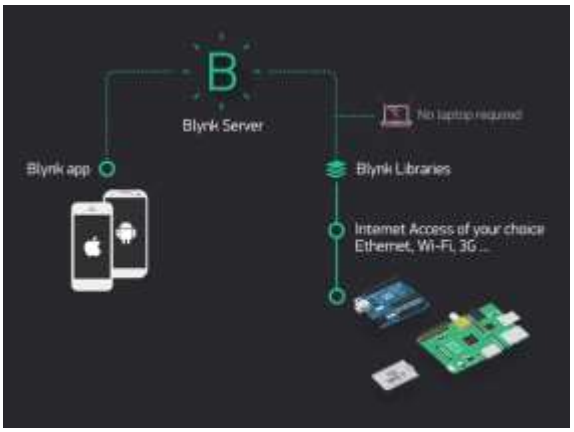


Fig 5.6 Blynk Library

Now imagine: every time you press a Button in the Blynk app, the message travels to space the Blynk Cloud, where it magically finds its way to your hardware. It works the same in the opposite direction and everything happens in a blynk of an eye.

RESULT AND DISCUSSION

The seeds are planted uniformly at equal distances as the robot moves forward. The seeds are kept in a hopper, making it simple for them to pass through the funnel and into the connected hose. The seeding tasks are carried out by servo motors in a smooth-running seed placement mechanism.

The deployment of agricultural robots in a commercial farm setting significantly improved various aspects of farming operations. The robots performed tasks such as crop monitoring, planting, spraying, and harvesting, demonstrating their effectiveness in increasing efficiency and productivity.

Robotic planting systems demonstrated precise seed placement and optimal spacing, resulting in uniform crop emergence and improved stand establishment. The use of robots reduced labour requirements, minimized human errors, and increased planting speed. As a result, farmers experienced higher germination rates and improved crop uniformity, positively impacting overall yields. The implementation of robotic spraying systems enabled targeted application of pesticides, herbicides, and fertilizers. The robots used computer vision and machine learning algorithms to identify crop areas, adjust spray rates, and minimize chemical usage. This approach not only reduced environmental impact but also optimized resource utilization, resulting in cost savings for farmers.

The results obtained from the deployment of agricultural robots highlight their significant potential in transforming modern farming practices. The use of robotics in crop monitoring and management allowed for a more data-driven approach to farming. Real-time data collection and analysis facilitated prompt decision-making, leading to optimized resource allocation and improved crop health.

At last agricultural robots have demonstrated their potential to revolutionize the farming industry. Through automation, precision, and data-driven decision-making, these robots can enhance crop management practices, improve resource utilization, and increase overall productivity. Continued advancements in robotic technologies and their integration with agricultural practices will pave the way for a sustainable and efficient future of farming.

APPLICATION

Weather conditions

The data garnered by sensors in the case of temperature, humidity, moisture precipitation and dew detection aids in concluding the weather pattern in farms so that the cultivation is executed for appropriate crops.

The whole IOT ecosystem is made up of sensors that detect real-time weather conditions like humidity, rainfall, temperature, all very crucial for crop production. These sensors are able to foresee any drastic change in the climatic conditions that can affect the production. An alert is sent to the server about the change in climate which helps to eliminate the need for physical presence. This ultimately leads to higher yields.

Remote sensing

IOT based remote sensing makes use of sensors placed along the farms such as weather stations for accumulating data that is carried forward to analytical tools for analysis. The crops can be monitored by farmers via analytical dashboards and action can be taken from the insights derived accordingly.

Greenhouse Automation

Robots play a vital role in greenhouse operations. They can control environmental parameters like temperature, humidity, and lighting, ensuring optimal growing conditions for crops.

Robots can also automate tasks such as seed planting, irrigation, pruning, and monitoring, enabling efficient and precise management of greenhouse operations.

Crop Spraying

Agri-robots equipped with spraying mechanisms can accurately apply pesticides, herbicides, and fertilizers to crops. They use sensors and computer vision to identify target areas and adjust spray rates based on crop density or specific plant requirements. This targeted approach minimizes chemical usage, reduces environmental impact, and optimizes resource utilization.

Planting and Seeding

Robots can automate the process of planting seeds or transplanting seedlings with high precision. They can navigate through fields, determine optimal seed spacing, and plant seeds at the correct depth and location. This reduces labour requirements and ensures consistent seed placement, improving germination rates and overall crop uniformity.

ADVANTAGES

- It is powered by renewable energy,
- It is simple to assemble,
- It more affordable,
- It easy to clean up after, quiet, and does not produce air pollution.
- It is also lightweight and easy to manage.
- Set of easy-to-use Widgets
- Direct pin manipulation with no code writing
- Easy to integrate and add new functionality using virtual pins
- History data monitoring via Super Chart widget
- Device-to-Device communication using Bridge Widget
- Sending emails, tweets, push notifications.

CONCLUSION

Our project was an impressive accomplishment in the area of agriculture. The Multi -purpose agricultural machine is very helpful for the employees because it allows them to perform several tasks with just one machine.

Every component is positioned so that it can be reconfigured to carry out the required task at every step of agriculture. To improve the yield and cut labour costs, our team has effectively combined numerous ideas from various mechanical engineering disciplines and agricultural knowledge

Additionally, motor can be used to power the machinery, Reducing the workload. Depending on the sort of land, the tire can be changed. Because each plough tool tip is made individually, Only the tool tip needs to be replaced in the event of a break. For simplicity of control, a steering mechanism can also be implemented.

Small farmers can increase output by using a solar-powered seeding and watering device. To lower the cost of the machine, a common seed storage location is added to it. The shortcomings of the current sowing machine are effectively addressed

in our machine. The agricultural community and small producers will benefit more from it.

The deployment of these robots has resulted in increased efficiency, precision, and productivity in farming practices. The precision and accuracy of robotic planting systems have resulted in uniform crop emergence, enhanced stand establishment, and reduced labor requirements. Robotic spraying systems have enabled targeted application of pesticides, herbicides, and fertilizers, leading to more efficient resource utilization and minimized environmental harm.

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