DEVELOPING AN INTEGRATED AUTONOMOUS FARMING SYSTEM BASED ON INTERNET OF THINGS (IOT) AND WEB SENSOR NETWORK (WSN) TO ENHANCE THE EFFICACY OF THE ROUTINE FARMING PRACTICES AND BUMPER CROP YIELD

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ABSTRACT

Lately, there has been a rising interest in smart farming solutions for streamlining crop products while lessening manual intercession requirements. The Internet of Things (IoT) is a new technology demonstrating how networking and computing will evolve. One of the most important applications of IoT-based wireless sensor networks is remote agricultural monitoring. The IoT-based remote sensor network deals with issues because of the powerful changes in the climate. For the vast area to be monitored, more sensor nodes are needed. In the IoT-based wireless sensor network, we can reduce the number of nodes and, as a result, the system's overall cost by allowing all nodes to move around. This task proposes an IoT-based cultivating robot network for cultivating applications. In addition, robots have an infrared sensor that helps them navigate obstacles. We also developed a system that automatically watered plants. These robots can be utilized for reaping, pesticide showering, and controlling weeds. The proposed framework gives a proficient and savvy method for overseeing crops while decreasing the requirement for physical work.

INTRODUCTION

Indian agribusiness is different, from conventional cultivating practices to present-day farming advancements. Farming assumes a fundamental part in the monetary development of a country. The primary occupation for human survival is agriculture. The agricultural industry is the foundation of financial matters worldwide, giving food and unrefined components to different businesses. In this way, the security and improvement of cultivating are fundamental. There are various yet-to-be-handled issues in agribusiness, as a huge piece of the techniques used by the ranchers should be refreshed and meet the sensible result. New technologies for maximizing crop production and minimizing the environmental impact of farming practices have become essential due to rising food demand, rising global population, and a lack of manual labour. Innovation in farming is developing step by step and showing us great outcomes. The improvement of savvy cultivating arrangements utilizing the Internet of Things (IoT) and Web Sensor Network (WSN) advances has shown incredible commitment. The Internet of Things (IoT) significantly impacts agriculture's shift toward technology. The autonomous farming robot is a self-contained system that optimizes crop growth by monitoring and controlling various environmental parameters.

A. Objective

1) Farm robots aim to help the area in its effectiveness and benefit.

2) portable robots work in the agricultural area to further develop efficiency, productivity and natural manageability.

B. Proposed Framework

1) Horticulture exercises should be possible consequently.

2) Robots will do some tasks with practically no human mediation.

3) In farming, the robot will perform tasks like levelling, watering, spraying pesticides, and detecting leaf diseases.

4) Python can use the SVM (Support Vector Machine) algorithm to identify leaf disease.

5) SVM Calculation will give the sickness name and the pesticide to be utilized.

6) Robots can be worked sun powered based.

STRATEGY

1) The framework comprises wheeled portable robots, for example, Enslaver and Slave hubs.

2) The specialist robot is outfitted with all sensors that can explore autonomously in the field and recognize weeds.

3) The expert robot is liable for framing a compact far-off sensor network through the remote convention and can truly obtain the channel.

4) different robots/oppressed individuals can join the organization by picking a similar recurrence channel. The slave robot joins the system and sends sensor data to the controller node.

5) The controller node uses the Node MCU module to transfer information from various sensor nodes to the Internet of Things. 6) The master robot has an image acquisition camera that might be used to detect weeds and leaf diseases.

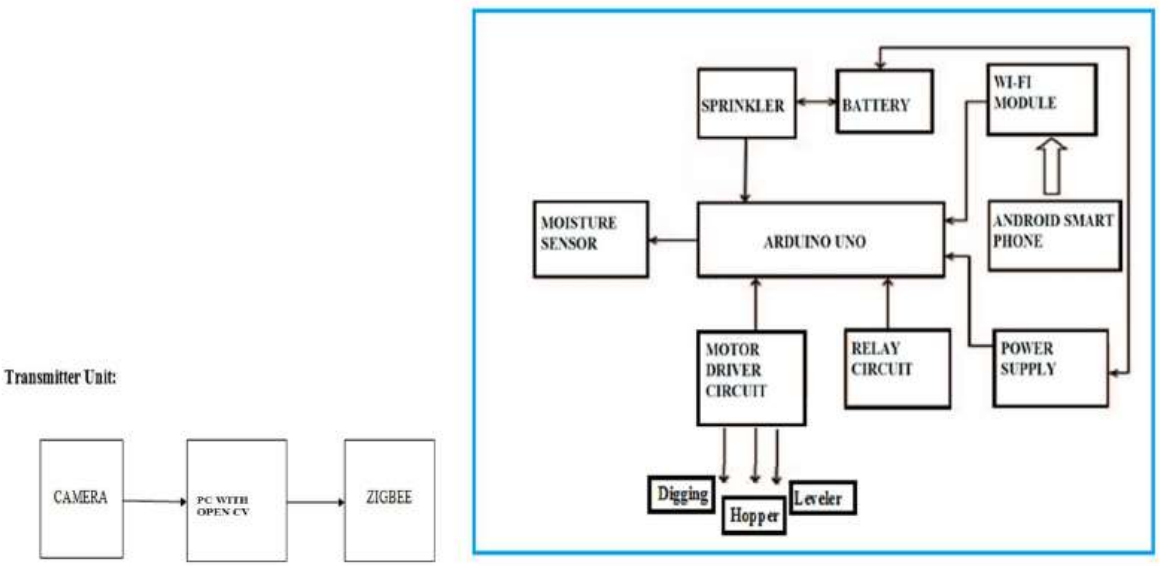

Fig 1- Block Diagram Of System

EQUIPMENT NECESSITIES

1) Microcontroller

Fig 2- Diagram of Arduino Board

2) Water Siphon:

3) Soil Dampness Sensor:

4) Pesticide Siphon:

5) H-Extension (L293D):

6) DC Engines:

PROGRAMMING NECESSITIES

1) Arduino Suite: The open-source Arduino Programming (IDE) simplifies composing code and transferring it to the board. This product can be utilized with any Arduino board. This product can be utilized with any Arduino board. There are two adaptations of the Arduino IDE: the IDE 1. x.x and IDE 2 is the other. x. The IDE 2. x is a brand-new major release quicker and more powerful than IDE 1. x.x. It includes advanced features to assist users with coding and debugging, a more contemporary editor and a more responsive interface.

2) Inserted C: Installed C is the most well-known programming language for creating electronic devices with many capabilities. Each function is a collection of statements used to carry out specific tasks. Implanted C programming assumes a key part in carrying out a particular role by the processor. The C programming language gives Implanted C Programming Language, an augmentation of C Program Language usually utilized in planning Inserted Frameworks. It involves sentence structure and syntax similar to the key capability factors, circles, information type announcements, capabilities, explanations, etc.

3) Streak Sorcery: Flash Magic is a PC program for programming flash-based NXP microcontrollers in the target hardware with a serial, Ethernet, CAN bus, or SWD. In five easy steps, you can erase and program a device, set key options, and automatically program checksums. The Blaze Enchantment Creation Framework NET accompanies a LabVIEW 32-bit VI for eradicating, programming and checking NXP Cortex Gadgets. Ideal for incorporating into existing systems of test and production engineering.

RESULTS

The farming robot will involve a skeleton as a base to interface and gather everything on it, comprising four engines.

Two of which are toy engines and other stuff engines. There are three distinct functions that the robot can perform.

- Digging
- Container
- Leveler

These will be working in various modes. The various modes will each require their separate programming. The LCD will show the information given to the robot by the client. The estimations of the length and expansiveness of the field are to be given in feet.

1) Mode 1: Digging

Here got another innovation for planting the seeds in a specific request. Every crop has a unique spacing between the seeds used to place them. So to beat the issue, a robot will dive into the dirt and spot the seeds. The placement of seeding is explained in Table 4.2.

2) Mode 2: The hopper can transport seeds and drop them in a specific hole being dug by a robot.

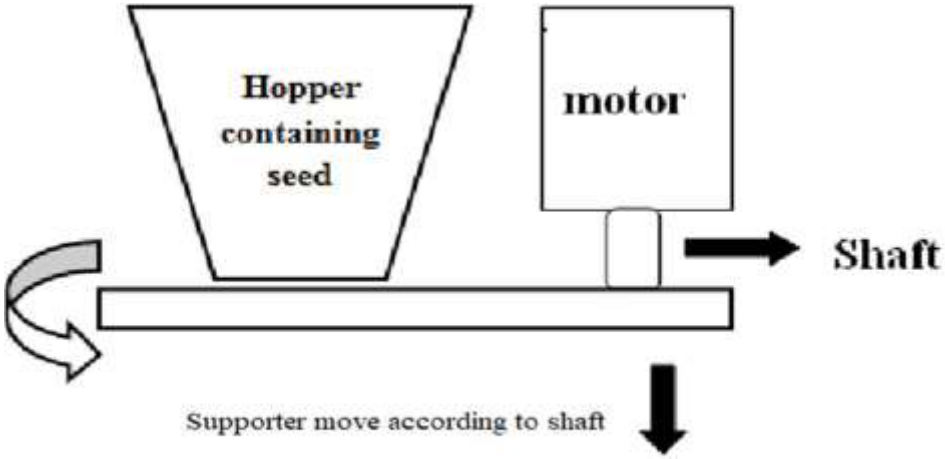

Fig 3 – working Of Hopper

3) Mode 3: Before the robot, the Leveler is positioned. This will assist with making a lopsided surface into a level shape. Simply lowering the front actuators will accomplish this. Up-and-down levellers on the even surface will level the area when the robot starts moving forward. This is viable with evening out gardens, little regions, shutting holes, etc.

4) Mode 4: Sprinkler This is a water pump that is light, compact, efficient, energy efficient, low consuming, and quiet. It has been utilized broadly; in families, including cooking, cleaning, washing, space warming and watering blossoms, etc.

5) Mode 5: Leaf Infection

The tomato tests with six issues are considered to assess their precision and perceive the leaf sickness as Sound or Unfortunate. As a piece of picture handling, the examples of tomatoes are resized to 256 × 256 pixels to keep up with equivalent size throughout the investigation. The leaf samples are segmented, and the quality is maximized using HE and K-means clustering.

Whether the leaf is diseased or not can be predicted at an early stage of operation using the K-means clustering response. The limits of the leaf tests can be separated utilizing form following.

The DWT, PCA and GLCM are utilized to separate the educational locales/elements of the examples. In the following stage, as a piece of AI draws near, the SVM, KNN and CNN are utilized to order the highlights, and the presentation of the model is recorded.

CONCLUSION

Multipurpose independent horticultural robot" has been executed and tried for different capabilities like furrowing, cultivating, evening out and water showering. It was created by incorporating farming robots with C programming. Using reasonable route sensors to the robot cultivating framework makes the framework monetarily versatile to the climate. Improved robot cultivating frameworks can expand food creation impressively and monetarily. With completely computerized ranches from here on out, robots can play out every errands like cutting, treating, checking irritations and sicknesses, collecting, ploughing, and so forth. Additionally, farmers can supervise the robots without having to operate them, thanks to this. Any other kind of crop can be added to the project. As a result, it can be utilized in the real-time agricultural sector.

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