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AGROBOT : AGRICULTURAL ROBOT USING IOT

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ABSTRACT :

Agrobot is an innovative solution designed to revolutionize modern agriculture by integrating IoT (Internet of Things) technology into a versatile robotic platform. This project aims to address the challenges faced by traditional farming practices by introducing an autonomous and intelligent robot capable of performing various tasks such as planting, monitoring, and harvesting crops with minimal human intervention. The Agrobot utilizes sensors, actuators, and connectivity modules to collect and analyze real-time data regarding soil moisture, temperature, crop health, and environmental conditions. Leveraging this data, the robot makes informed decisions to optimize crop yield, reduce resource consumption, and mitigate potential risks. Additionally, Agrobot offers scalability and adaptability to different types of crops and farming environments, making it a promising solution for sustainable and efficient agriculture in the era of digital transformation.

Keywords: Microcontroller, Agrobot, automation, Central Processing Unit (CPU), Input Devices.

1. Introduction:

Approximately 70% of people in India depend on agriculture as their primary source of income. The agricultural sector has seen less progress than other fields. Agricultural tasks like harvesting and plowing may now be completed automatically, and as there is the availability of autonomous devices like robots. The precise requirements for the field and the ambient circumstances in which the robot must operate to automate agricultural chores are two crucial considerations for any robot builder. By raising the productivity rate, the use of robotics in diverse agricultural tasks including harvesting, seeding, and plowing would help farmers produce higher-quality output.

Agrobot aims to revolutionize agriculture by leveraging IoT (Internet of Things) technology to create smart agricultural robots. These robots are designed to assist farmers in various tasks such as planting, watering, monitoring crop health, and harvesting. By integrating sensors, actuators, and connectivity, Agrobot optimizes farming processes, increases efficiency, and reduces manual labor. Its capabilities include real-time data collection, analysis, and autonomous decision-making, ultimately leading to improved crop yields and sustainable farming practices.

Existing Model

Almost 70% of Indians rely on agriculture as their primary source of food. In contrast to other domains, agricultural development is quite low.These days, farming tasks like planting and harvesting can be completed automatically because to the availability of automated equipment like robots. When designing a robot, two key factors need to be taken into account: the precise specifications needed for the field and the surrounding conditions in which the robot will operate to automate agricultural processes. The application of robotics to agricultural tasks such as harvesting, dispensing seeds, and plowing will help farmers achieve higher yields by boosting production rates. These methods fail to differentiate between the soil and crop in close proximity**.**

From the aforementioned problems, an inventive and robotized agricultural framework (using field robots) is demonstrated. With the assistance of a computerized software, robots may labor tirelessly in any environment to complete the necessary workouts. One of the main benefits of lightweight robots is that they don't compact muddy ground.

The autonomous agricultural robot is expected to operate in the following modes of operation: A. MODE-1 This mode is called the "seed dispensing mode," and it allows for the dispersion of seeds in the soil while simultaneously monitoring obstacles. The robot's rear, where the dispenser is mounted, is equipped with an RPM DC motor. An Arduino software has been programmed to determine the exact moment at which the dispenser will vibrate.

1.1. Proposed Model

The main goal is to support farmers and the agriculture sector in order to reduce the likelihood of food shortages. This is achieved by effectively tenfolding crop output, analyzing soil fertility for improved plant growth, and assisting with the prevention of plant epidemics.

Determining which fertilizer is more appropriate for protecting plants, assessing the weather and plants that thrive in a given environment, and forecasting the arrival of natural disasters like floods and droughts to use a controller to protect crops in advance.

1.2. Project Description

A computing device that performs a single, well-defined task is known as an embedded system. Examples of embedded systems are devices like mobile phones, fax machines, air conditioners, VHS and DVD players, printers, and so on. Each of these appliances will include an embedded software program that runs on the CPU in order to meet the unique requirements of the application, as well as a processor and specialized hardware to meet those requirements. Firmware is another term for the embedded software. The desktop and laptop computers are multipurpose devices. It can be utilized for numerous tasks like word processing, accountancy, software creation, gaming, and more.

On the other hand, the following embedded devices' software is always fixed: Unlike other systems, embedded systems can only be configured to do a single, very defined task. Memory is one of the most scarce resources on embedded systems. They typically lack secondary storage options like floppy disks and CDROMs. Embedded systems are subject to specific time constraints.

Almost all processors produced, 99 percent of them, are used in embedded systems. The market for embedded systems is expanding at one of the fastest rates since these systems are utilized in every industry, including consumer electronics, office automation, industrial automation, biomedical engineering, the military, telecommunications, data transmission, wireless communication, transportation, and so forth.

A few examples of office automation products that use embedded systems are the copier, fax machine, key phone, modem, printer, and scanner.

Numerous intriguing embedded system applications are being made possible by developments in mobile communications. One of the wonders of the past ten years of the twentieth century is the mobile phone. This incredibly strong embedded system allows voice communication while we're moving. Through the Internet, multimedia services can now be accessed by palmtop computers and personal digital assistants. Strong embedded systems are also found in mobile communication infrastructure like base station controllers and mobile switching centers.

2. MICROCONTROLLER

Specifically created for use in physical computing applications, Raspberry Pi introduced the Pico W, a wireless microcontroller board. As the replacement for the original Raspberry Pi Pico, the Pico W adds new Wi-Fi and Bluetooth features while keeping the Raspberry Foundation's core RP2040 ARM CPU.

The Infineon CYW43439 wireless chip, which is integrated into the Raspberry Pi Pico W, is a noteworthy feature that allows Bluetooth 5.2 and IEEE 802.11 b/g/n wireless LAN capabilities. The wireless connectivity made possible by this feature increases the Pico platform's adaptability and connectivity choices.
The main distinction between the Raspberry Pi Pico W and its predecessor is that the latter has the CYW43439 chip, which supports both Bluetooth and Wi-Fi. The RT6154A from Richtek has been utilized in place of the RT6150B from the original Pico design in the upgraded power regulation system. To make room for the Wi-Fi antenna, the debug port was moved close to the System-on-Chip (SoC).
There are two main ways to power the Raspberry Pi Pico W:

USB Port: Using the USB port, which offers a 5V supply, to power the Pico W is the easiest and most popular approach. External components can take power from the same source since this 5V can also be accessible from the VBUS pin.

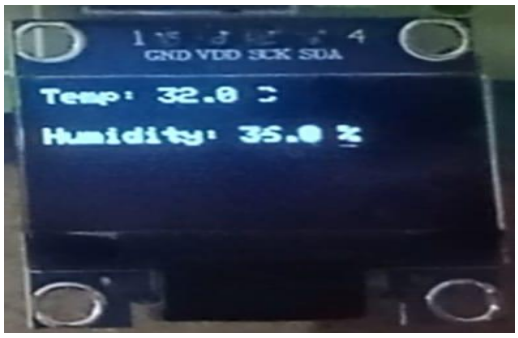
VSYS Pin: Alternatively, a voltage range of 1.8V to 5.5V can be applied to the VSYS pin to power the Pico W. You can attach a battery or other type of power supply to this pin. The board and any associated peripherals can then be powered by the stable 3.3V that the integrated voltage regulator creates from the input voltage.

The Raspberry Pi Pico W may be integrated into a variety of projects with flexibility thanks to these power options, which support both external and USB-based power sources depending on the needs of the application.

3. Result and Discussion

Our agricultural robot is specifically developed to make farming easier, hence meeting the growing demand for food. It was created with the impoverished and illiterate farmers in mind. Robotic agriculture systems produce better results than manual ones. It's an automated farming robot that starts working as soon as it receives instructions on the size of the field, the type of seed, and the operating mode. It is a very basic, yet incredibly efficient robot for working in agriculture. This robot, which makes use of easily obtained and reasonably priced industrial parts, is highly economical when considering both the perspective of impoverished farmers and engineers.

Additionally, this is more environmentally friendly than tractors and pumps, which primarily run on oil. It is projected that this robot will shift farming from manual to automated in the next years. Agrobot's applications include time savings, increased efficiency, labor force reduction, resource conservation, and cost effectiveness. We can influence the next generation's enthusiasm in farming with the aid of this robot, which is crucial for the nation's development. These robots can be made to meet the needs of farmers, resulting in highly productive output.



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