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IoT Based Crop Monitoring Drone Using Mobile App

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Abstract: Drone technology is revolutionizing agriculture by providing real- time data collection, analysis, and informed decision-making. This research paper explores the development of an IoT-based crop monitoring system using drones and a mobile application. The system aims to optimize resource allocation, improve crop health, and enhance yield. The drone is designed with humidity sensors and cameras, captures detailed images of crops, detecting pests, diseases, and nutrient deficiencies. The improvement of this system has the capability to address issues contributing to poor harvest yields and transform the way farmers monitor and manage their crops.

Keywords: drones, crop, monitoring, food.

I. INTRODUCTION

Agriculture is a critical sector worldwide, facing increasing pressure to the necessity of a growing global population . Orthodox farming technique often depend on manual monitoring and generalized approaches, which can direct to inefficient resource utilization and suboptimal crop yields . In recent years, the integration of technology into agriculture, often referred to as "smart agriculture" or "precision agriculture," has emerged as a promising solution to identify difficulties in farming. Smart agriculture leverages various technologies, including the Internet of Things (IoT), drones, remote sensing, and artificial intelligence (AI), to improve production efficiency and sustainability.

IoT devices, such as sensors, can collect real-time data on various parameters like soil conditions, weather patterns, and crop health . Drones prepared with cameras and sensors can provide comprehensive field surveys and high-precision growth tracking . It's crucial to the success of the Indian economy. To raise agricultural output and efficiency, providing secure cultivation conditions for farmers is crucial. In a 2018 survey, researchers found that 9.2% of the global population had severe difficulties securing enough nutrition. Continuing to reduce food supplies will lead to a desperate situation. The food insecurity issue was moderate, affecting up to 17.2% of the community who did not have reliable access to enough food. Around 26.4% of the entire population is affected by the combination of a moderate and severe food availability issue. Food

distribution systems and crop production were hit hard by the COVID-19 epidemic. Several farmers were hampered by the untimely delivery of essential agricultural inputs such as labor, seeds, fertilizers, and pesticides, leading to lower yields.

This paper focuses on an IoT-based crop monitoring system that combines the capabilities of drones and a mobile application. This technique is developed to provide users, with a comprehensive and user-friendly solution for monitoring crop health, optimizing resource allocation, and improving overall yield. The integration of these technologies enables real-time data collection, analysis, and informed decision-making, leading to more efficient and sustainable agricultural practices.

II. PURPOSE OF DESIGN AGRICULTURE CROP MONITORING DRONE

Designing an IoT-based crop monitoring drone is important for boost farming methods, enhancing efficiency, sustainability, and productivity. This involves real-time information collecting and analysis, early disease detection, and optimized resource management. Drones, equipped with sensors and cameras, capture critical environmental and plant health parameters, such as temperature and humidity levels. This comprehensive data collection enables farmers to

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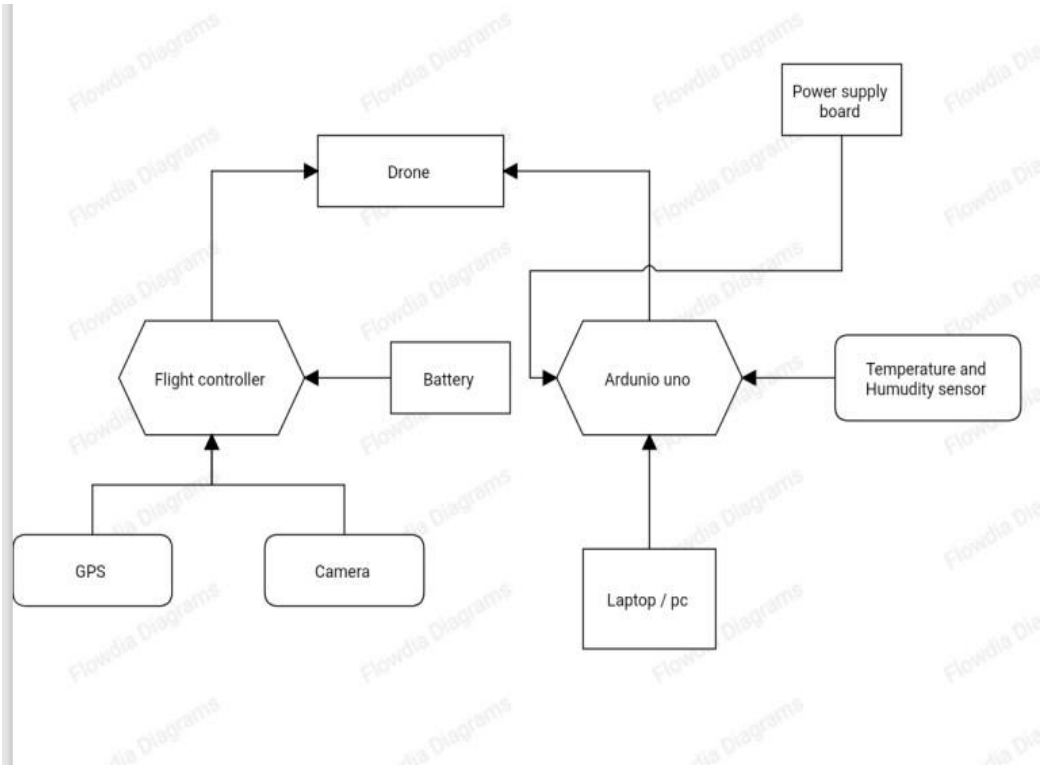
obtain accurate understanding of their crops and fields. Early disease and pest detection is important for preventing widespread crop damage and minimizing losses. This data can be analyzed to provide farmers with accurate data, supporting better decision-making and improved agricultural outcomes.

III. BLOCK DIAGRAM



As the population is growing so quickly, ensuring everyone has enough to eat is becoming more difficult task. By 2050, world food production will need to expand by around 50% if we're going to be able to feed a population of a billion people. Around two- thirds of the Indian population relies on agriculture for their livelihood. When it comes to crop monitoring and other agricultural practices, Indian farmers rely on time-tested methods. Traditional crop monitoring and fertilizer spraying methods are more time-consuming and inefficient. For instance, the COVID-19 outbreak made it incredibly difficult for traditional farmers. For this reason, innovation in this area of technology is essential.

The purpose of this implementation is to construct a stabilized drone capable of taking photographs in the field that can be used for examining the damaged or decaying crops, as well as providing information on the various phases of crop health and the general development of the crops. The technology of drone is an effective method for getting these challenges in agriculture. Specialists in rural areas and farmers may be able to improve their practices by using data obtained by drones to raise crop production.

Fig: Crop Monitoring drone

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IV. RESULT AND DISCUSSION

The drone which is implemented specifically for agriculture has the potential to provide better harvests. Farmers' use of drones has the potential to change agriculture sector. There are many unmanned aerial platforms utilized in farming. All throughout the world most of them are little drones fitted with specialized cameras for keeping an eye on farms. In this project, drones are used to take pictures of plants in fields, making it easier to check for things like rot or damage, which ultimately leads to better crop yields.

Fig. live data of temperature and humidity

The below is the image of “Bean Plant” which we compare with the help of mobile app plantix.

Result No 1 Before Analysis

Fig: Bean Plant

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Result No 2

Before Analysis

Fig: Brinjal Plant

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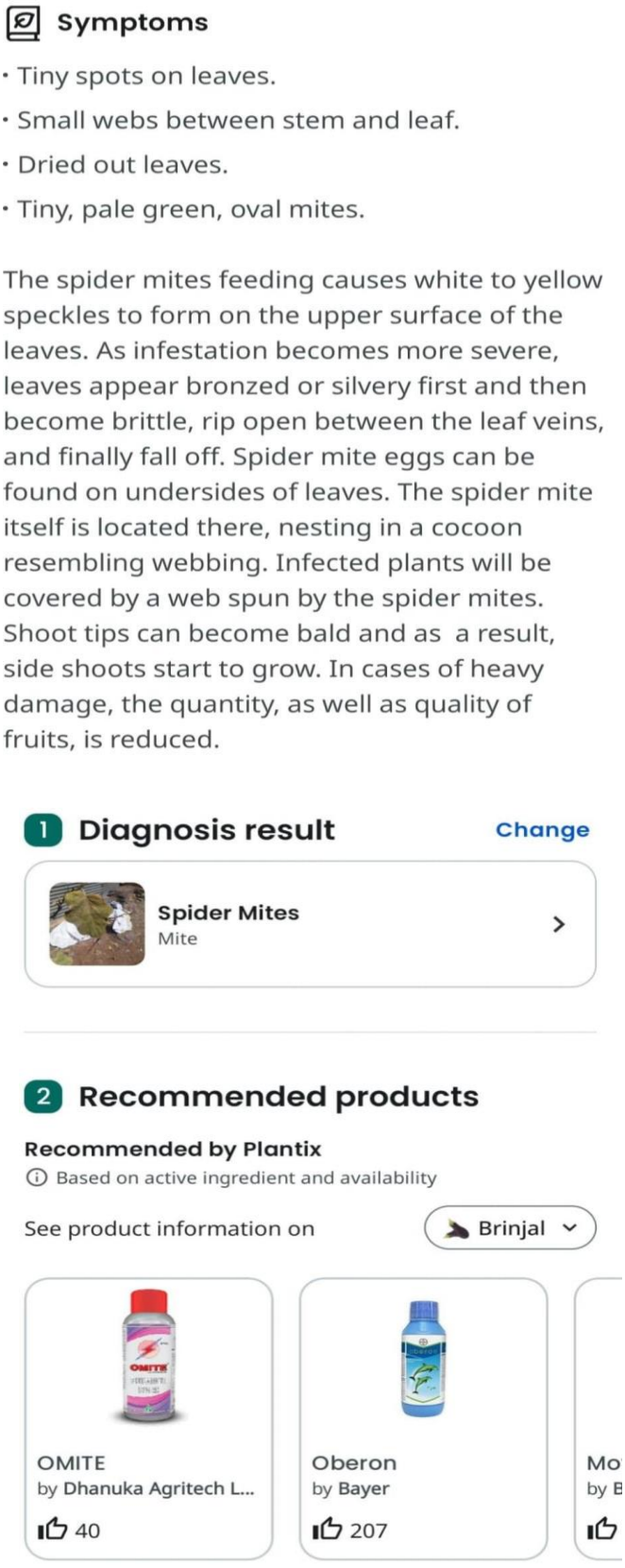
DIAGNOSIS RESULT



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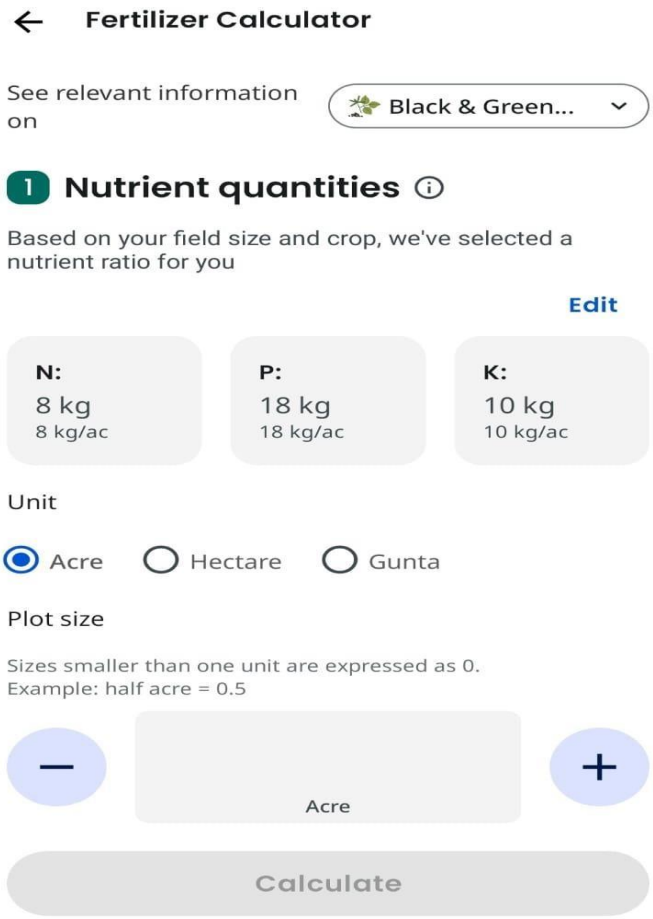
Also we can calculate the amount of fertilizer to be use in farm. Based on field size and crop.



V. FUTURE SCOPE

The ability of quad-copters to lift weight may be improved by increasing either the motors number powering the aircraft or the size of the propellers being used. The battery capacity determines the amount of time the aircraft can stay in the air. The duration of a charge is a variable. When many sensors are combined, the output is enhanced. DIP methods may be used to identify dead crops and separate them from healthy ones.

VI. CONCLUSION

We learned everything from the definition of unmanned aerial vehicles (UAVs) to the inner workings of each kind of UAV now on the market to the reasons why drones are so important right now and where the industry is headed. What kinds of improvements are needed in the current drone, and how to make drones for performing well in operations that would be difficult or dangerous for humans to carry out on their own, such as data collection from remote locations, are all topics that could benefit from further exploration. In this study, we detail the design of an unmanned aerial vehicle (UAV) that may be used in a control loop for agricultural applications, in which UAVs are tasked with monitoring both agricultural areas and the surrounding environment. Yet UAVs will play a significant role in the future development of precision agriculture. Significant cost reductions (up to 90%) in the areas of water use, chemical waste, and human labor are anticipated. The majority of agricultural UAV applications involve low-altitude, low-weight flights over deserted or privately owned land; therefore compliance with flight restrictions is a concern.

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