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Smart Plant Health Control System

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Abstract
Pest infestations are in the group of main issues farmers deal with. Detecting the infection manually in its early stages is a big challenge farmer's face while interacting with pest attacks. The rapid spread of sickness is causing farmers to endure significant losses. This enormous Loss is unable to manage until the insect's invasion is handled physically. This approach aims to identify insect's assaults in its early stages. This study suggests an automatic approach to recognize insect's attacks and alerting farmers to infections. The RaspberryPi 3B is connected to humidity and temperature sensors for measurement. The plant's pictures are taken for further processing. Later, we compare them with healthy images. We have compared the threshold values for humidity and temperature. When the readings of humidity and temperature in the acquired image surpass the threshold values that could be classified as an affected image. Because it differs from the healthy leaf that was sampled. The diseased leaf is recognized, finally, the agriculturist is notified via TWILIO. The affected leaf is identified, and the farmer is notified via the TWILIO. The real-time data are examined with the sample data.

Keywords: *Smart Plant, Raspberry Pi, Agriculture, Soil's Moisture*

1. Introduction
Agriculture's purpose is the breeding and nurturing of plants, animals, and other organisms, such as fungi, in order to produce biofuel, food, fiber, medicinal plants, in addition to other goods that benefit and support living creatures. The secret to "betterment in agriculture" is very crucial, requirement for a developing country. Agriculture may be at risk from pest attacks. These insect infestations often lead to a decline in productivity [1-2]. Therefore, to identify insect's attacks effectively and efficiently, a specific system is needed for pest identification/detection. So, we have suggested a framework that is embedded with TWILIO. Insect assaults are identified continuously by observing with the assistance of this system. This design indicates a technique for identifying humidity and temperature. Furthermore, it makes things simpler to warn farmers about the impacts of insect invasions. RaspberryPi is programmed to capture an image as soon as the atmospheric levels rise above a predetermined threshold [3]. The real, healthy leaf has been contrasted with the photographed image. Following the processing whole aforementioned values, an agriculturalist gets notification of the illness. The processing of images is employed to enhance the pictures. Several benefits come with using a Raspberry Pi, including built-in Wi-Fi and Bluetooth, a powerful processor, and capacity to process pictures that aren't suitable for other processors.

2. Existing System
This study aims to predict the appearance of insect-induced risk factors in field plants. First, by connecting sensors to the RaspberryPi board and computing an infectious level linked to a plant disease, it was possible for them to obtain measurements of the critical environmental factors, namely temperature, humidity, and the wetness of the leaf, which promote the rise of the leaf's disease along with pests. The approach of beta regression being employed as a common method to compute the extent of impact for a prediction model. The Python programming language was then utilized in the weather forecasting module to make predictions. The outcome demonstrated that Python and RaspberryPi

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were successful in predicting insect invasions. Temperature, humidity, duration of leaf wetness, rainfall, and various environmental conditions significantly affect the rate of infection and the severity of the disease. A mathematical model is developed to figure out the future values of infection by employing the association between these characteristics and the infection rate. It forecasts whether there is a risk or not that the specific infection will affect that specific crop/product.

3. Proposed System

The study that is being done exclusively addresses pest in circumstances where managerial actions are not necessary. This determines the specific disease that is caused, also identifying the invader in our work. This work includes environmental parameters and images to obtain the identification process, whereas the current method only includes environmental parameters.

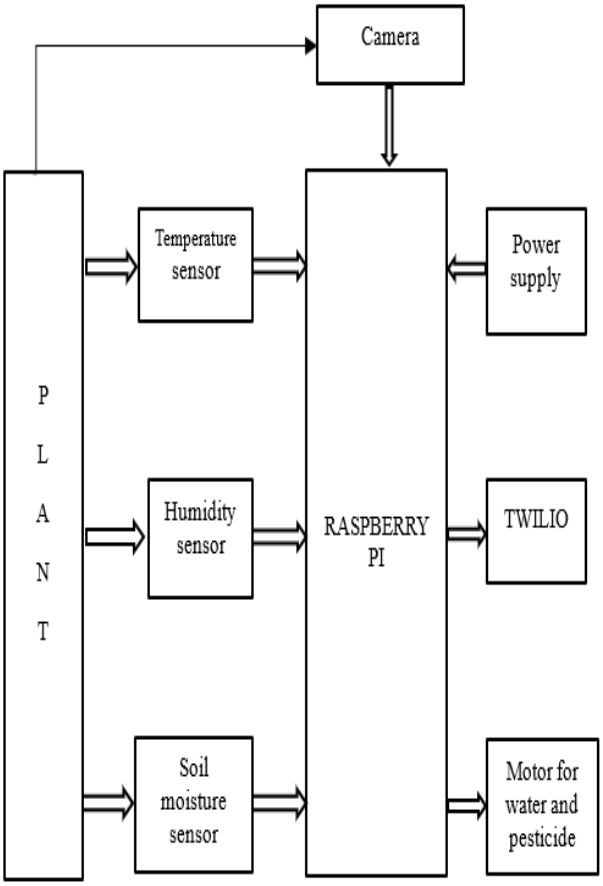

Figure 1 Proposed System's Block Diagram

The proposed work utilizes an additional facility to measure the field's moisture level. The technology used has a built-in sensor to measure the field's moisture level. In the event of low moisture content, Pumping of water operations would activate automatically. The proposed system's block diagram is displayed in fig.1. Based on their expertise and interpretation of the weather, farmers apply pesticides to their crops at the right times to prevent illness and insect's infestations, even in the absence of actual pest activity. Thus, this causes several health problems. However, this technology detects insect attacks at their earliest stages and notifies the farmer of them. Therefore, it's not required to spray pesticides unintentionally. Additionally, this device has a sensor for measuring soil's moisture. If the amount of moisture falls within the specified level, then water is immediately sprinkled.

4. Implementation

A system that is embedded made to detect pest attacks with the assistance of a TWILIO and a Raspberry Pi-3B. Soil moisture sensor, Raspberry pi-3B, DHT11 atmospheric sensors, and TWILIO are utilized in this work. The temperature changes are tracked through temperature sensor [4]. The amount of moistness in the atmosphere is tracked by the humidity sensor. Due to climatic fluctuations, certain diseases are emerging, the atmospheric sensors are employed to monitor variations by those changes. When using soil for irrigation, a soil's moist analyzer being employed used to track the soil's moisture level. The database contains the standard atmospheric readings humidity, temperature values. All of the previously stated sensors communicate with RaspberryPi-3B. For image processing, a Raspberry Pi-3B has been employed [5]. Python is the programming language used in this work. Comparing the diseased leaf to healthy leaf is the primary use of image processing [7]. The snapshot is taken as soon as the humidity, temperature levels rise above a certain threshold thanks to clever scripting. The acquired image and the plant's original image are compared. The illness is determined by evaluating the actual values, if the two photos do not match [6]. To communicate with farmers, TWILIO is utilized. The flow chart of the system is depicted in figure 2.

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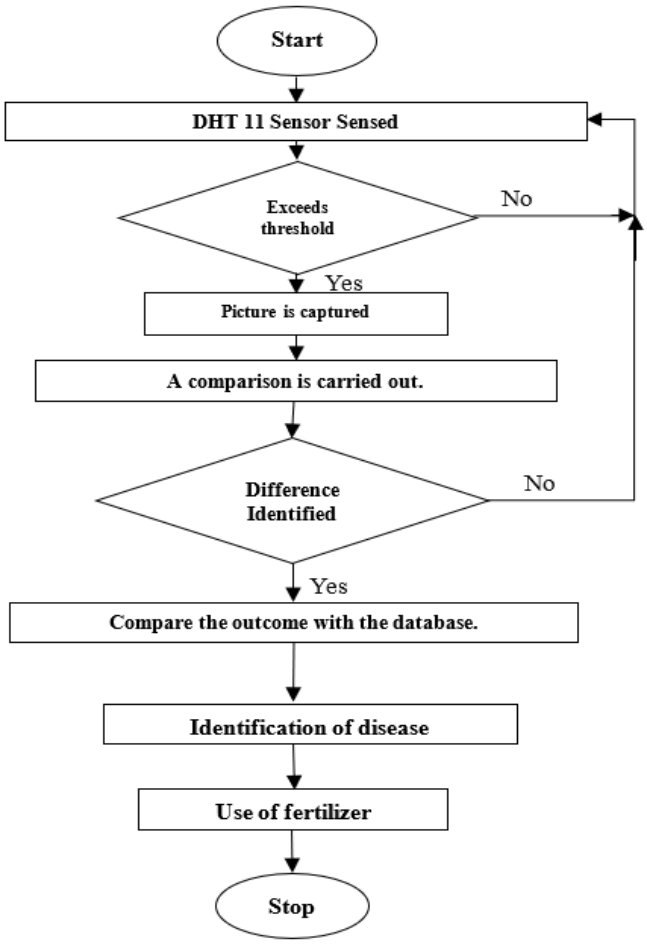

Figure 2 Flow Chart of The System

5. Results and Discussions

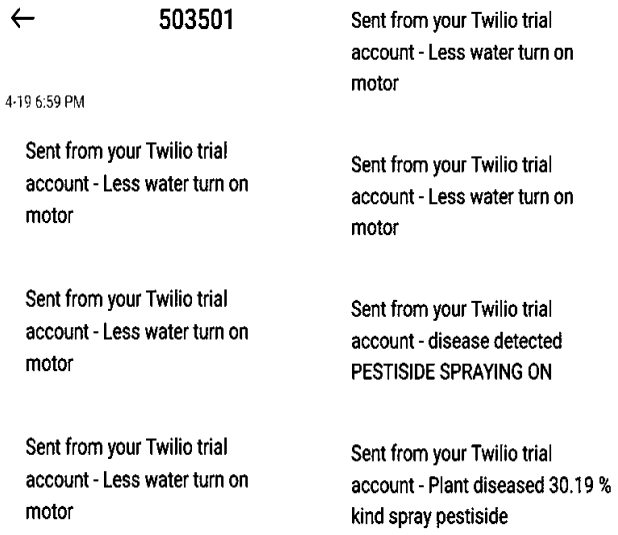

Figure 3 Picture of Alert Message

Table 1 Details of An Infectious Disease and System Results

Name of the pest	Temperature and humidity	Symptoms	Management
Wilt	22 degree and 60%	Yellowing of the stem	Apply carbendazium 2gram
Sett rot	33 degree and 68%	Brownish spots in leaves	Spraying fungicide like bavisten
Red rot	45 degree and 57%	Colour of leaf changes from green to orange	Spray tridemorph
Rust	23 degree and 75%	small, elongated yellowish spots on leaf	Spray tridemorph 1.0 litres

Raspberry Pi, the main device, has a connection to the input and output phases. The input part is comprised of motor, atmospheric sensors, together with output part includes TWILIO that notify the user when irrigation is required in the planting area based on the soil's sensor for moisture detected function. Farmers received various warning signal s depicts in figure 3. The RaspberryPi receives all of the inputs, and it delivers the appropriate data. The RaspberryPi is set up to take a picture if a threshold value is reached for characteristics like temperature or humidity. All the resulting attributes are contrasted with sampled values, which ultimately determine the illness's and notify the farmer of the danger. The functionality of the system, together with its basic sections possesses distinctive characteristics for the technology design. Table 1 lists the pests that affect sugar cane crop.

Conclusion

To identify and manage pest attacks, an embedded-based system is employed for identifying insects and control. This technology contributes to a decrease in product loss. Through informing the farmer of the sickness in addition, it enhances the system even more. For agricultural purposes, this approach is therefore a great and practical answer. It also lessens the requirement for significant Human involvement in crop maintenance worldwide. The concept of cloud

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computing can be used to further develop this system. Without any requirement for human labor, the disease may be detected and the fertilizer/pesticides can be sprayed immediately. This method has advantages in properly identifying the condition and preventing unintentional pesticide spraying. The ability to recognize and stop the pest onslaught in its early stages is another benefit.

References

[1]. Ojha, T., Misra, S., &Raghuwanshi, N. S. (2015). Wireless sensor networks for agriculture: The state-of-the-art in practice and future challenges. Computers and Electronics in Agriculture, 118, 66-84.

[2]. Thilagavathi, G. (2013, April). Online farming based on embedded systems and wireless sensor networks. In 2013 International Conference on Computation of Power, Energy, Information and Communication (ICCPEIC) (pp. 71-74). IEEE.

[3]. Anire, R. B., Cruz, F. R. G., &Agulto, I. C. (2017, December). Environmental wireless sensor network using RaspberryPi 3 for greenhouse monitoring system.IEEE 9th International Conference on Humanoid, Nanotechnology, Information Technology, Communication and Control, Environment and Management (HNICEM) (pp. 1-5), 2017.

[4]. Kodali, et. al IoT based weather station, International Conference on Control, Instrumentation, Communication and Computational Technologies (ICCICCT) (pp. 680-683), 2016

[5]. John, J., et. al... Design and implementation of a soil moisture wireless sensor network, 21st National Conference on Communications (NCC) (pp. 1-6), 2015

[6]. Upendra, et. al. social life network for disease and pest control, 14th International Conference on Advances in ICT for Emerging Regions (ICTer) (pp. 266-266), 2014

[7]. Gondal, M. D., et. al... Early Pest Detection from Crop using Image Processing and Computational Intelligence. FAST-NU Research Journal ISSN, 2313-7045