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Design and Development of Autonomous Farming with Plant Health Indication System

Prof. G. D. Shelake[1], Swarup Kumbhar[2], Akash Gaikwad[3], Ratndeep Deshmukh[4], Oam Mulik[5]
Professor Department of Mechanical Engineering[1]
Students, Department of Mechanical Engineering[2,3,4,5]
JSPM's Rajarshi Shahu College of Engineering, Pune, Maharashtra, India

Abstract: *Families in India rely on agriculture for close to three-quarters of their income. Plant illnesses and insects like the Tongo virus, moths, and butterflies affect almost all types of crops. Farmers have trouble identifying true sickness. An average of 80% of crops suffer damage from disease and insects, according to an Indian crop survey. Diseases can be avoided if the issues are known in advance. Using IoT technology, these industries have room for development. Therefore, we are developing an Internet of Things (IoT) based robot that will keep an eye on the crop as well as its surroundings. This method employs machine learning to pinpoint the issue and implement countermeasures to illnesses and insects that threaten the crops. In addition to an ESP 8266 for IoT, several sensors are employed to examine the environment. Although several prototype guiding systems have been created, they have not yet been made available for purchase. Our crop monitoring technology would benefit Indian farmers because it is effective and reasonably priced.*

Keywords: IOT, Disease, ESP 8266, Agriculture, Farmer

I. INTRODUCTION

India, farming is a common occupation. Rising input costs, a shortage of qualified workers, a lack of water resources, and crop monitoring are some of the primary issues facing Indian agriculture. The automation technology was applied to agriculture to solve these issues. Agriculture automation may enable farmers to exert fewer resources. The Internet of Things (IoT) is an essential component of many industries, including the automotive, medical, and industrial ones. Its productivity in the agriculture sector is also steadily rising. IoT platforms have not yet been used for all of these services, which include monitoring the environment, soil health, irrigation systems, and other things. The greatest productivity hindrance is caused by this illness. The application of technology like the Internet of Things (IoT) to agronomic plants and crops could have a significant influence. In the farming industry, manually identifying diseases in plants is a crucial task because plant ailments are common. On the other hand, if the proper steps are not taken into account, it has real effects on plants and reduces the quantity, quality, or productivity of crops and plants. It is advantageous to find plant infections using a pre-programmed process since it reduces the laborious task of inspecting vast product farms. We have put out a technique for image processing that is used for automatically locating and identifying plant leaf diseases based on programming. It also includes research on various illness characterization techniques that can be applied to identify plant leaf ailments. In addition to assessing the infection, this model uses image processing to compare the soil quality with plant health, which is an important aspect for determining the location of the infection in plant leaf disease.

II. METHODOLOGY

1. Crop monitoring via IoT ESP 8266
2. Soil fertility check
3. Irrigation System
4. Environment monitoring

- These features will operate in various modes. Different modes require unique programming
- The robot receives information from the sharp sensor by measuring the field's length and width.

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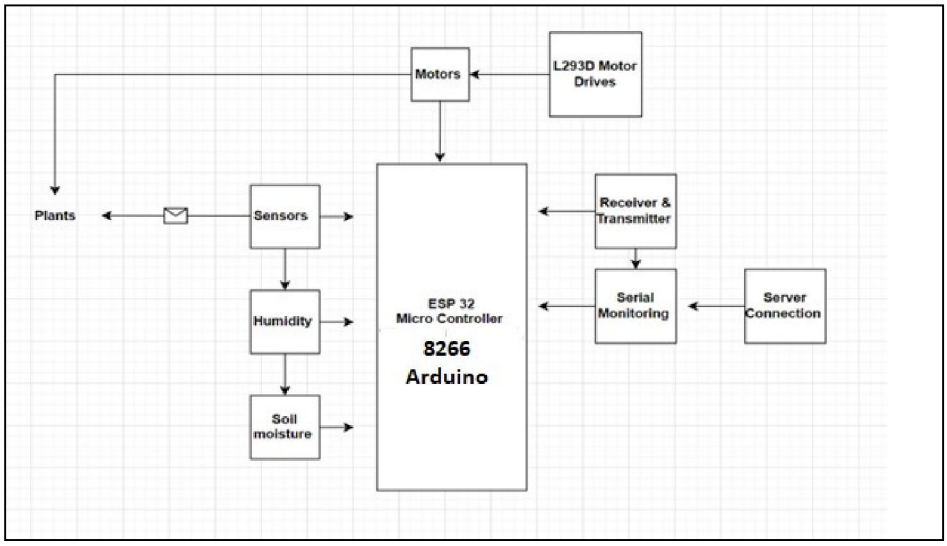
- Check the soil's moisture level: Not all crops require the same amount of moisture. While some people may require more moisture, others may require less. We now have an irrigation system that is efficient and will function in accordance with the needs of the plants.
- Examining the environmental conditions: Each crop requires a certain climate where it can develop more quickly and produce more. Therefore, when we examine the environment, we learn whether or not the crop will yield more. We can take some safety measures if not.
- The soil moisture sensor and pH sensor will be used to determine the soil's fertility.

III. PROPOSED SYSTEM



Construction of the project

- The ESP 8266 is a controller with an integrated wi-fi module that can be used to monitor a specific Sensor or its data.
- A temperature, wetness, and humidity sensor are included with the project.
- These sensors operate in accordance with collaborations and measure the atmosphere around them. for illustration
- If the ambient temperature is high, the fan is turned on to maintain a steady temperature for the plantation's efficient growth.
- It provides water spraying based on the soil's or the atmosphere's humidity or moisture levels by turning on the water motor as needed with the help of the given motor drivers.
- Motor drivers are employed to regulate the activation of the motor ONN & OFF for a specific soil moisture, humidity, and temperature.

Note

- Using an empirical value of the area, we may control the fan's ON or OFF and spraying activities.
- As an illustration, suppose that the controller is programmed to automatically cut off the motor when the temperature drops below 30 degrees and the atmosphere reaches a temperature of more than 45 degrees.
- Water spraying also functions similarly to what was stated above, depending on the moisture content of the soil or environment, etc.

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IV. CONCLUSION

The main controller for the Farm Health Monitoring system is an Arduino Micro-Controller. It has a temperature, humidity, and soil moisture sensor. These data are tracked using an ESP 8266 model IoT device and an LCD display.
A cooling fan will start to operate to cool the area when it exceeds 33 0C in the surroundings. When the soil moisture situation changes, the same relay's working channel will turn the water motor on and off. The project has been successfully created and tested to the highest level of automation.

V. OUTCOMES

- As a result of the enormous advancements in technology, farmers that invest now can start to become more productive, produce healthier crops, and boost their profits.
- Automating slow, boring, and repetitive chores for farmers with the use of agricultural robots frees them up to concentrate more on raising overall production yields, which will become increasingly important as the world's population rises.
- Farm automation techniques can increase agriculture's profitability while also lessening its environmental impact.
- Site-specific application software can lower greenhouse gas emissions and cut back on the usage of fertiliser and pesticides.

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