Soil Condition and Crop Disease Monitoring System using IOT

Mr.P Koteswara Rao, Ms Ria Joy, Ms. P Divya, Ms A V S Vyshnavi and Ms N Sravani

Abstract: This project deals about the status and efficiency of agricultural land i.e., soil condition checking and crop disease as agricultural production inversely affected by pest infection and plant diseases. The IOT in environmental monitoring helps to know about the condition of soils and crop to enhance the productivity of farm. Here, unmanned aerial vehicle, an aircraft with no pilot onboard, commonly known as drone used to survey the farmland and collect information regarding the soil properties and crop condition and sends those to server. The flying drone consists of camera, sensors and IOT system. With the help of electronic sensors we are able to obtain values of phosphorous, nitrogen, moisture etc. Thus the property of soil IOT system picks up the sensor data and captures the image regarding the infected areas in farm. Thus the image processing unit receives image as input and produces image characteristic features. Image processing hardware follows the steps as 1) Image acquisition 2) Image pre-processing 3) Segmentation 4) Feature extraction 5) Identification. To view remotely the conditions in the form of images the hardware device i.e., microcontroller is connected to a wireless technology as Zigbee.

Keywords: IOT, drone, image processing, zigbee, electronic sensors.

1. INTRODUCTION

With the drastically growing population the current model of agriculture is unsustainable. But with the advancement of new range of technologies and automation innovative solutions can be explored thus to feed the growing crowd. In an environmentally isotropic country like India, where the larger section depend on agriculture for livelihood the crop production is hampered by nutritional deficiency, climatic conditions and the various crop diseases, temperature and conditions of the soil, and also the intrusion of animals in to the field. IOT can also play a significant role in precision farming to enhance the productivity of the farm. The rapid development of agricultural IOT has an important role in realizing intensive Agriculture, high yield and high quality providing solid foundation for development with in Agricultural information technologies. In this paper we monitor the various diseases those affects the paddy crops along with soil condition required

2. LITERATURE SURVEY:

As early as in the 90’s an attempt was made by Hetzroni et al. (1994) cited by [1] using neural networks to monitor the health of plants. In their system, they tried to detect zinc, iron and nitrogen deficits by observing lettuce leaves. An analogue video camera was used in image capturing and then digitalized afterwards. The digital image is segmented into background and leaf in the first phase of their algorithm. The required feature (colour and size) are extracted from both the HIS and RGB pictures of the image. These extracted parameters are fed finally into the analysis phase made of neural networks and statistical classifiers, which then determines the condition of the plant [1]. Sena et al. (2003) proposed a method of detecting diseases on leaves using a pre-set threshold value (h), which aims at differentiate among maize plants affected by fall armyworm from healthy employing digital images. Their proposed algorithm was divided into two sections namely the image processing and image analysing. At the processing stage the captured image is transformed to grey scale, filtered and threshold to removed noise. The image is then divided into twelve block at the analysis stage of their algorithm and blocks with leaves less than 5% with respect to the total area are thrown away. The number of connected objects (n) signifying the diseased areas is totalled for each remaining block. The plant is concluded to be disease infected if this number is above a set value (threshold), (thus if n > h) which, after experimental assessment, was set to 10 [11]. Al Bashish et al. (2010) proposed a method which attempts to detect 5 diverse plant diseases. The authors of this paper didn’t lay down the types of plants used in their tests, and the images existed in situ. After a pre-processing stage to cleanup the image, a K-means crowding algorithm was applied to divide the image into 4 clusters. From their
paper, at least one of the clusters must match to one of the diseases. Afterwards, a number of texture and colour features are extracted from each by means of the supposed Colour Co-Occurrence Technique, which runs with images in the HSI presentation. The features are then fed to a MLP Neural Network with ten (10) concealed layers, which implements the final identification and classification [12].

A mobile enhanced image processing approach for detecting plant leaf diseases was proposed. The research aimed at developing an image recognition system that can recognize crop diseases. The first stage of their methodology was to digitalize the uploaded leaf image by the system user via mobile phone to a remote server. A mathematics morphology is employed to segment these images, then shape, texture and colour features of colour image of disease spot on leaf is extracted, and finally a classification technique of associates functions was used to discriminate between the three types of diseases.

3. PROPOSED SYSTEM:

4. HARDWARE COMPONENTS

1. ARDUINO

The Arduino Uno is a microcontroller board based on the ATmega328. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 Analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.

2. LCD

The LCD display consists of two lines, 20 characters per line that is interfaced with the PIC16F73. The protocol (handshaking) for the display is as shown in Fig. The display contains two internal byte-wide registers, one for commands (RS=0) and the second for characters to be displayed (RS=1). It also contains a user-programmed RAM area (the character RAM) that can be programmed to generate any desired character that can be formed using a dot matrix. To distinguish between these two data areas, the hex command byte 80 will be used to signify that the
display RAM address 00h will be chosen. Port1 is used to furnish the command or data type, and ports 3.2 to 3.4 furnish register select and read/write levels.

3. Temperature sensor

LM35 is a precision IC temperature sensor with its output proportional to the temperature (in °C). The sensor circuitry is sealed and therefore it is not subjected to oxidation and other processes. With LM35, temperature can be measured more accurately than with a thermistor. It also posses low self-heating and does not cause more than 0.1 °C temperature rise in still air.

4. Humidity sensor

<table>
<thead>
<tr>
<th>Sensor</th>
<th>Temperature Range</th>
<th>Humidity Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>DHT11</td>
<td>0 - 50°C/±2°C</td>
<td>20 - 80%/±5%</td>
</tr>
<tr>
<td>DHT22</td>
<td>-40 - 125°C/±0.5°C</td>
<td>0 - 100%/±2.5%</td>
</tr>
</tbody>
</table>

5. Moisture sensor

The soil Moisture sensor FC-28 has four pins. The Module also contains a potentiometer which will set the threshold value and then this threshold value will be compared by the LM393 comparator. The output LED will light up and down according to this threshold value.

6. pH Sensor

A pH meter is a scientific instrument that measures the hydrogen-ion activity in water-based solutions, indicating its acidity or alkalinity expressed as pH.[2] The pH meter measures the difference in electrical potential between a pH electrode and a reference electrode, and so the pH meter is sometimes referred to as a "potentiometric pH meter". The difference in electrical potential relates to the acidity or pH of the solution.[3] The pH meter is used in many applications ranging from laboratory experimentation to quality control. Potentiometric pH meters measure the voltage between two electrodes and display the result converted into the corresponding pH value. They comprise a simple electronic amplifier and a pair of electrodes, or alternatively a combination electrode, and some form of display calibrated in pH units.

7. Zigbee

Now-a-days Zigbee is becoming very popular for low data rate wireless applications. It has two bands of operation 868/915MHz and 2450MHz. 868/915 band provides about 20-40Kb/s and 2450MHz band provides about 250 kb/s data rates. In addition to this uses Zigbee end devices can go to sleep mode which saves battery consumption and it also takes care of security of the information owing to security layer.

CIRCUIT DIAGRAM:
The flow chart above looks into the step by step procedure for analysing diseases in crops.

RESULT:

CONCLUSION

Here, we made use of IoT in a most advanced and simplest way so as to observe the soil condition and continuous monitoring for crop diseases. This points to a future with automation of agriculture with drones and self-sufficient electronic systems.

REFERENCES


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