WWW.IJRPR.COM

International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

IOT Based-Soil Parameters Analysis System Using Solar Energy

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A B S T R A C T

A vast fraction of population of India considers agriculture as their primary occupation. Bad quality crop production is often due to either excessive use of fertilizer or using not enough fertilizer. For efficient crop growth, it is essential to measure the level of nutrients present in the soil. The humongous growth in technology has opened new and innovative doors for agriculture and made it more significant and popular. With the advent of technology there is a huge shift towards smart farming that will help in meeting the global market demands. More and more companies and researches have been directed towards Internet of Things (IoT) that makes human intervention minimal and thus helps in manoeuvring towards increased production, efficiency and meeting huge global market demands. In our project we focus on one of the main elements of a plant growth that is effective nutrient management. Out of the many important nutrient needed for an effective plant growth we focus on the three Macronutrient of utmost importance namely-Nitrogen, Phosphorus and Potassium or NPK. The proposed system of IOT enabled soil analysis system is based on measuring and observing soil parameters. This system lowers the probability of soil degradation and helps to maintain crop health. Different sensors such as NPK (Nitrogen, phosphorus, potassium), pH, soil moisture are used in this system for monitoring temperature, humidity, soil moisture and soil pH along with colour sensors for NPK nutrients of the soil. This project presents a study of soil and the relevant parameters involved in the prediction of suitable crops to avoid the problem of soil infertility and to improve the quality of crops.

1. Introduction

Soil testing is used to do chemical analysis of soil and to find status of fertility of soil. Soil testing also plays an important role in prediction of required nutrients of the crops. Soil testing further includes testing of soils for properties like pH, moisture and nutrients required for effective crop growth like Nitrogen, Potassium and Phosphorus. The measurement of Nitrogen, Phosphorus and Potassium, (i.e. N, P, K respectively) levels of soil is vital to make a decision what quantity additional contents of those nutrients are required to extend fertility of soil. The standard of soil is thus enhanced which subsequently provides a better yield quality of crop. Researchers in agriculture are looking for ways to optimize plant yield while minimizing the consumption of fertilizer. Since these macro-nutrients vary even on a small scale throughout a cultivated field, numerous researchers have attempted to develop the sensors to map these nutrient contents.

2. MOTIVATION

This project uses IOT technology in agriculture, gathering crops growth environmental parameters in a fixed place to help farmers find problems in time. Agriculture experts give guidelines with specific information to increase the farmer's income and help them in the prevention and control of crop diseases and pests. Through the custom development of mobile phone apps, it has been implemented with agriculture technology promotion and expert online FAQ. The system development composes three parts: The server, Android client and PC client to achieve scalability, high reliability, security, compatibility of technical requirement. The system is also equipped with solar panel which provides power backup to the system in the absence of power supply. There is a real time display system which displays information collected by all sensors along with decision/action taken by Raspberry pie over internet. It has a provision of automatic and manual operation of relay using switches, provided on control panel over internet which can be accessed from anywhere in the region around the agriculture field.

3. OBJECTIVE OF THE PROJECT

Measuring the soil quality by considering various parameters will provide the early information regarding the potential effects and different primary land use activities that may be having long term affection soil quality.

a) It will help to identify whether the soil quality is degrading over time and the factors that may be contributing to the soil degradation.

b) The purpose of soil quality monitoring is to track changes in the features and characteristics of agricultural soil, especially the changes in chemical properties of soil occurring at specific time intervals under the influence of agricultural and nonagricultural human activity.

c) Soil monitoring and analysis reduces the cost of expenditure in agriculture practice too.

d) The solar based renewable power supply recharges the system automatically and hence reduces the time taken in recharging the system.

This system promotes eco-friendly practice of agriculture.

4. LITERATURE SURVEY

1) Title: Smart Agriculture Monitoring System Using IOT by Dr. Sanjay N. Patil , Madhuri B. Jadhav

This project uses IOT technology in agriculture, gathering crops growth environmental parameters in a fixed place to help farmers find problems in time. The system development composes three parts: The server, Android client and PC client to achieve scalability, high reliability, security, compatibility of technical requirement.

Drawbacks: Usage of electricity as a power source. The farmer cannot use the system during power shut down. Maintaining the Integrity of the Specifications.

2) Title: Detection of NPK nutrients of soil using Fiber optic sensor by Deepa V. Ramane, Supriya S. Patil and A. D. Shaligram

Measurement of N (nitrogen), P (phosphorus) and K (potassium) contents ofsoil is necessary to decide how much extra contents of the nutrients are to be added in the soil to increase crop fertility. This improves the quality of the soil which in turn yields a good quality crop. fiber optic based color sensor has been developed determine N, P, and K values in the soil sample. Here colorimetric measurement of aqueous solution of soil has been carried out. The color sensor is based on the principle of absorption of color by solution.

Drawbacks: These optical method are reliable, but time-consuming, complex & high cost per test. This resulted in the limitation of the number of soil samples tested for characterizing the spatial variability of soil nutrients in the fields.

3) Title: Testing/Monitoring of Soil Chemical Level Using Wireless Sensor Network Technology by Purvi Mishra1, Sudha Mapara and Preeti Vyas.

Testing/Monitoring of Soil Chemical Level Using Wireless Sensor Network Technology that the wireless sensor technology can help farmer know the exact time to apply fertilizers & compost to the field to increase productivity, save time, money& energy. Drawbacks: This sensor technology will not give measurement of the N,P,K contents in the soil .The temperature, humidity and various other parameters are not dealt with.

5. METHODOLOGY

1. Powering the system:*The proposed system uses the solar energy to produce the required electrical energy using solar panels and the power is stored by using battery so the dependency on the power grids will be reduced.*

2. Sensor data acquisition*: The sensors such as DHT11 Temperature, NPK(Nitrogen, Phosporus, Potasium), Soil moisture and pH detection is interfaced with Raspberry Pie.*

3. Digital Processing and Decision making:*The data processing is the task of checking various sensors data received from the field with the already fixed threshold values. The display can be made to switched ON automatically if the soil moisture and other parameters falls below the threshold and vice- versa. The farmer can even switch ON the Monitor from mobile using mobile application.*

4. Analyzing Process: In *The soil monitoring system is automated to analyze the data once received from the agriculture field's soil once the control received from the web application or mobile application.*

5. Web and Mobile applications*: The web and mobile application will be designed to monitor the field and soil contents from anywhere using internet connection through IOT devices.*

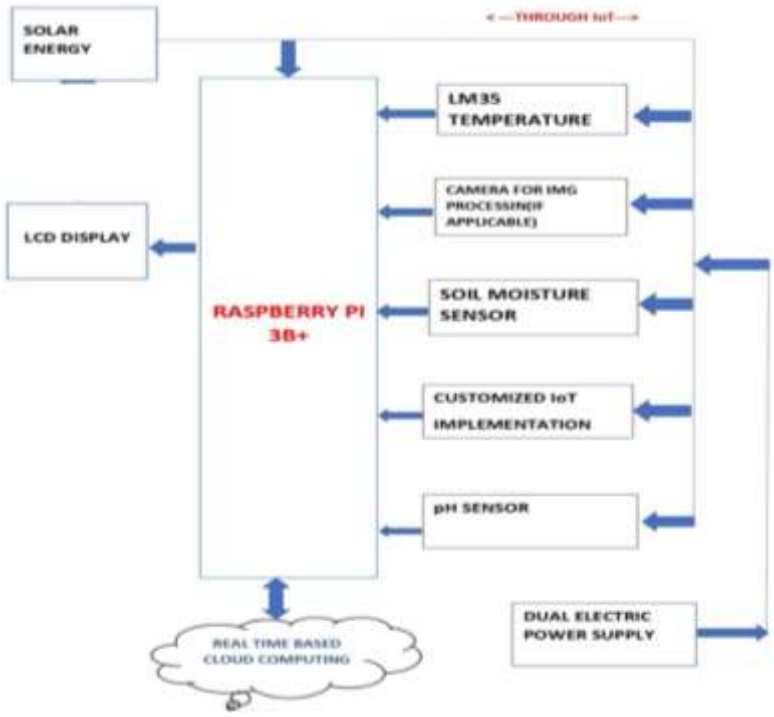

Figure. Block Diagram for proposed model Expected Outcome

6. EXPECTED RESULT

- This proposed work is made to help the farmers and make their Managing economical.
- The solar energy will be used for the charging of battery and it will be free of cost. The main advantage of solar system is in daytime we can store the electricity into the battery and we can utilize it for 24 hours because in rural area electricity is not available all the time due to load shading.
- The details of all the parameters of the field will be available in the fingertips of the farmer with the help of IOT.
- Recommendation system for crops and soil based. This application beneficial to the farmers in terms of crop production.
- This application is user friendly so everyone can use it easily. We have developed a movable kit that can be used by the farmers easily and efficiently in their farms.

7. CONCLUSION

Regular soil nutrient measurement in agricultural fields is challenging due to labor-intensive manual testing in laboratories. It results in farmers' disregard for the amount of nutrients in the soil and inefficient application of fertiliser at the wrong time. Through a simultaneous cloud display employing the created NPK sensor and its fuzzy rule-based system, the suggested system informs the farmer about the insufficiency of the three main soil nutrients, nitrogen, phosphorus, and potassium. To comprehend the functionality and enlighten the built IoT system's intended purpose, experimental simulations are conducted. It is evident from the experiment that the suggested system is a low-cost, precise, and intelligent Internet of Things system that automatically notifies the farmer when to apply fertiliser by cloud manifesting and can be used as a tool to assist farmers in agricultural purposes.

8. REFERENCES

N. Sakthipriya, "An Effective Method for Crop Monitoring Using Wireless Sensor Network", Middle-East Journal of Scientific Research ISSN 1990-9233 IDOSI Publications, 2014.

Ramya Venkatesan and Anandhi Tamilvanan, “Sustainable Agriculture System Using IOT” ,International Conference on Communication and signal processing, April 6-8,2017.

K.Lakshmisudha, Swathi Hegde, NehaKale,ShrutiIyer,“ Smart Precision Based Agriculture© 2020 IJSRET2216International Journal of Scientific Research & Engineering Trends Volume 6, Issue 4, July-Aug-2020, ISSN (Online): 2395-566XUsing Sensors”, International Journal of Computer Applications (0975-8887), Volume 146-No.11, July 2011.

Dr.Sanjay N Patil, Madhuri B Jadhav,"Smart Agriculture Monitoring System using IOT" ,International Journal of Advances Research in Computer and Communication Engineering,April-4,2019.

ChetanDwarkani M, Ganesh Ram R, Jagannathan S, R.Priyadharshini, "Smart Farming System Using Sensorsfor Agricultural Task Automation", IEEE International Conference on Technological Innovations in ICT for Agriculture and Rural Development (TIAR 2015).

Prof. K A Patil,N R Kale,A Model for Smart Agriculture using IOT" ,International Conference on Global Trends n signal processing ,Information Computing and Communication,2016