iJRASET
International Journal For Research in Applied Science and Engineering Technology



INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 7 **Issue:** VII **Month of publication:** July 2019

DOI: http://doi.org/10.22214/ijraset.2019.7063

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International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.177
Volume 7 Issue VII, July 2019- Available at www.ijraset.com

Testing and Monitoring Agricultural Soil using Precision Farming

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Abstract: ***Agriculture is the revolutionary part of our country. In spite of over all these development, the agriculture methods that Indians use are too much old. The previous method is collecting the soil sample and it has been tested in the laboratories. The tested result will be getting after few days. The problem due to this agriculture field is that the farmers are suffering much to get the farm survey reports quickly. Due to lack of facility to choose fertilizers for the chosen crop. Lab testing method is not able to detect the soil gaseous parameters for the live monitoring. The aim of this paper is to provide the soil testing services at the farmer's land by determining all the soil parameters such as gases present in soil like Ammonia, hydrogen, nitrogen, Methane, soil moisture level, nitrogen, potassium, phosphorus contents and recommending fertilizer nutrients for the soil. Live updating of this helps the farmers to get to know the current status of soil .We can suggesting the crops to the farmers based on the soil fertility and climatic conditions. As a result, the project will produce the survey report which contains NPK values and gases value, related crops and fertilizers for the soil.***

Keywords: Ammonia, hydrogen, Methane, soil moisture, nitrogen, potassium, phosphorus.

I. INTRODUCTION

At present soil ingredients are being tested solely at Soil Analysis Centre, wherever they use primitive technique. Within the existing system the soil may be tested simply to envision out the fertility and therefore the moisture level. As per the supply of nutrients, recommendations of cultivating actual crop are given with the hydrogen ion concentration conductor. The copper electrodes are used as sensing element that measures the ionic particles within the soil and converts to electrical signal. soil analysis will improve crop productivity and minimize wastage of those nutrients, therefore minimizing impact on environmental result through optimum production. Deficiencies of primary, secondary and micronutrients are discovered in intensive cultivated areas.

The primitive technique is grouping the soil sample and it's been tested within the laboratories. The tested results obtaining after few days. The matter because of this, farmers are suffering such a lot to urge the farm lands survey reports quickly. because of lack of facility to decide on fertilizers for the chosen crop. Soil analysis could be a valuable tool for farmers; it determines the inputs needed for value economical production.Live change of this helps the farmers to urge to understand the present standing of soil .We can suggest the crops to the farmers supported the soil fertility and climate. As result, the project can turnout the survey report that contains NPK and gases value connected crops and fertilizers for the soil.

II. AN OVERVIEW OF SOIL TESTING AND MONITORING

A soil monitoring will verify fertility, or the crop growth potential of the soil that indicates nutrient deficiencies, potential toxicities from the presence of non-essential trace minerals. Composite sampling will be performed by combining soil from many locations before analysis. this is often a standard procedure, however ought to be used judiciously to avoid skewing results. Soil testing is commonly performed by business labs that supply a range of tests, targeting teams of compounds and minerals. laboratory are that they're accustomed to the chemistry of the soil within the space wherever the sample was taken. This enables technician to suggest the tests that are possible to reveal helpful information-

A. To estimate accessible nutrient standing (macro, secondary and micro-nutrients) of soils.
B. To assess the sort and extent of drawback for reclamation of problematic soils.
C. To gauge the fertility standing of soils of a rustic or a state or a neighbourhood.

By soil test summaries the fertility status of available nutrients expressed as High, Medium or Low.

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III. LITERATURE SURVEY

To adapt with susceptible climatic challenges and to improve agricultural sustainability, it's a requisite to explore new technology that can be used to monitor crop fields in order to practice informed decision[1] Excess use of pesticides and chemical fertilizers degrades some useful microorganisms that are important for microbial activities in the soil[2] Soil test based nutrient management has come with key issue to increase agricultural productivity and production caused by desirable use of nutrients, based on soil analysis can improve crop productivity and minimize wastage of these nutrients as in[3] Colorimetry is used in the measurement of substances that are present in soil like Nitrogen, Phosphorus and Potassium which can be used in predicting the amount of fertilizer that will be applied to the soil.[4] A proper soil test will help to ensure the application of enough fertilizer to meet the requirements of the crop. It will also allow you to determine lime requirements and can be used to diagnose problem areas.[5]

IV. PLANNED DESIGN

In planned system, we introduced sensing element primarily based on soil sensing circuit for soil standing observance. It will transmit real time information on-line by integration with sensor. Primarily based soil sensing station provide farmer to watch unendingly the soil VOCs information, which might be related to with chemical and physical properties of the soil, thereby guaranteeing precise soil nutrient management. This might be related to with chemical and physical properties of the soil, thereby guaranteeing precise soil nutrient management. Array of few metal compound semiconductors (MOS) gas sensors with totally different gas sensing properties were accustomed notice VOCs free from soil. it's conjointly incorporates sensing element array containing various sensors to observe totally different parameter from soil and can give information unendingly to finish user with the assistance of wireless digital communication. Here we are able to use web content to supply real time soil observance to farmer which might be accessible from anyplace and anytime.

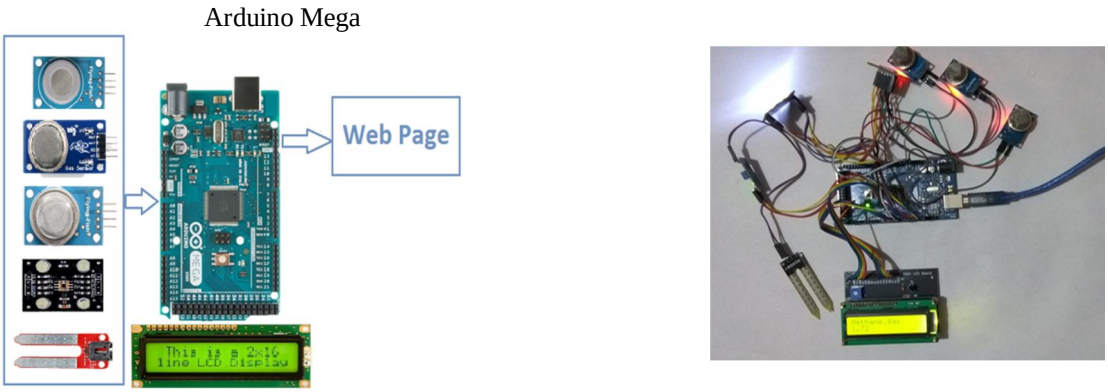
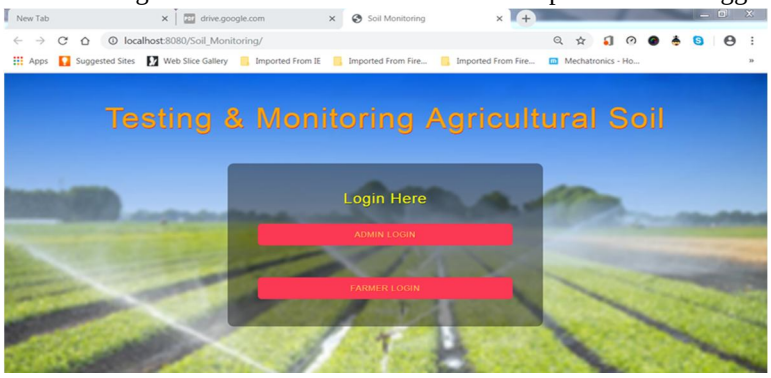


Fig. Experimental Setup

V. RESULT

A. Web Page Design

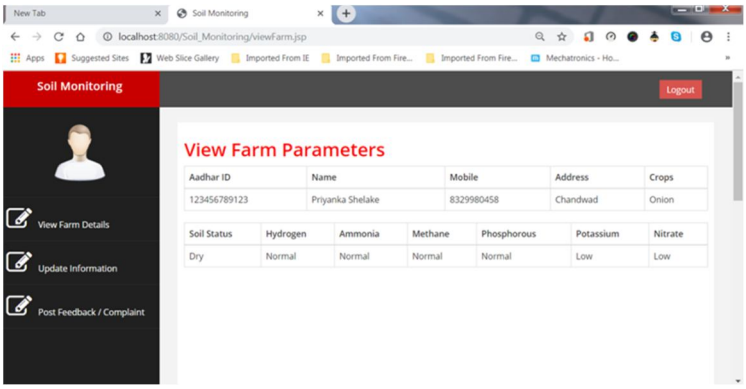
Web page is design to display all measured parameters like nutrients and gases. It has Login portal for Admin as well Farmer. Admin can add number of farmers to its login to take feedback from them and to provide them suggestion related to their crops.



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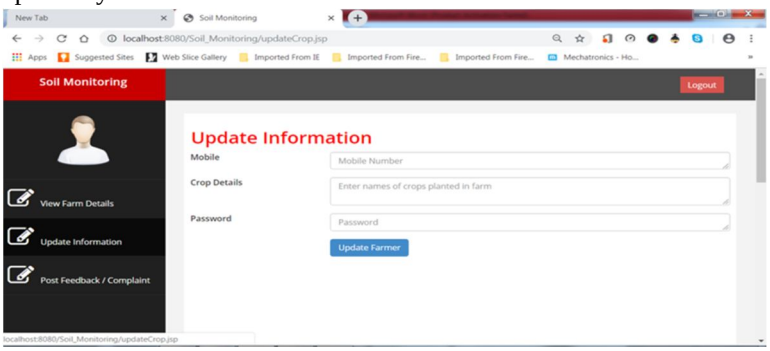
B. Output Image

It is consist of Farmer details and parameter status detail. As it shows status for nutrients like N,P,K and gases like Hydrogen, Ammonia and Methane. It also shows soil moisture status as Dry or Wet.



C. Feedback Portal

By using this facility farmers can give feedback to admin about soil quality and productivity. Also provide facility to update farmer's information and also crop variety.



VI. CONCLUSION

Soil testing allows to search out and helps to see in what proportion nutrients moreover get used. It will helps to protects the atmosphere by preventing over fertilization. And additionally identifies contaminated or no contaminated soils. on field testing consume time and cash needs .Also it provides Live monitoring using web page and also provide suggestion for next crop

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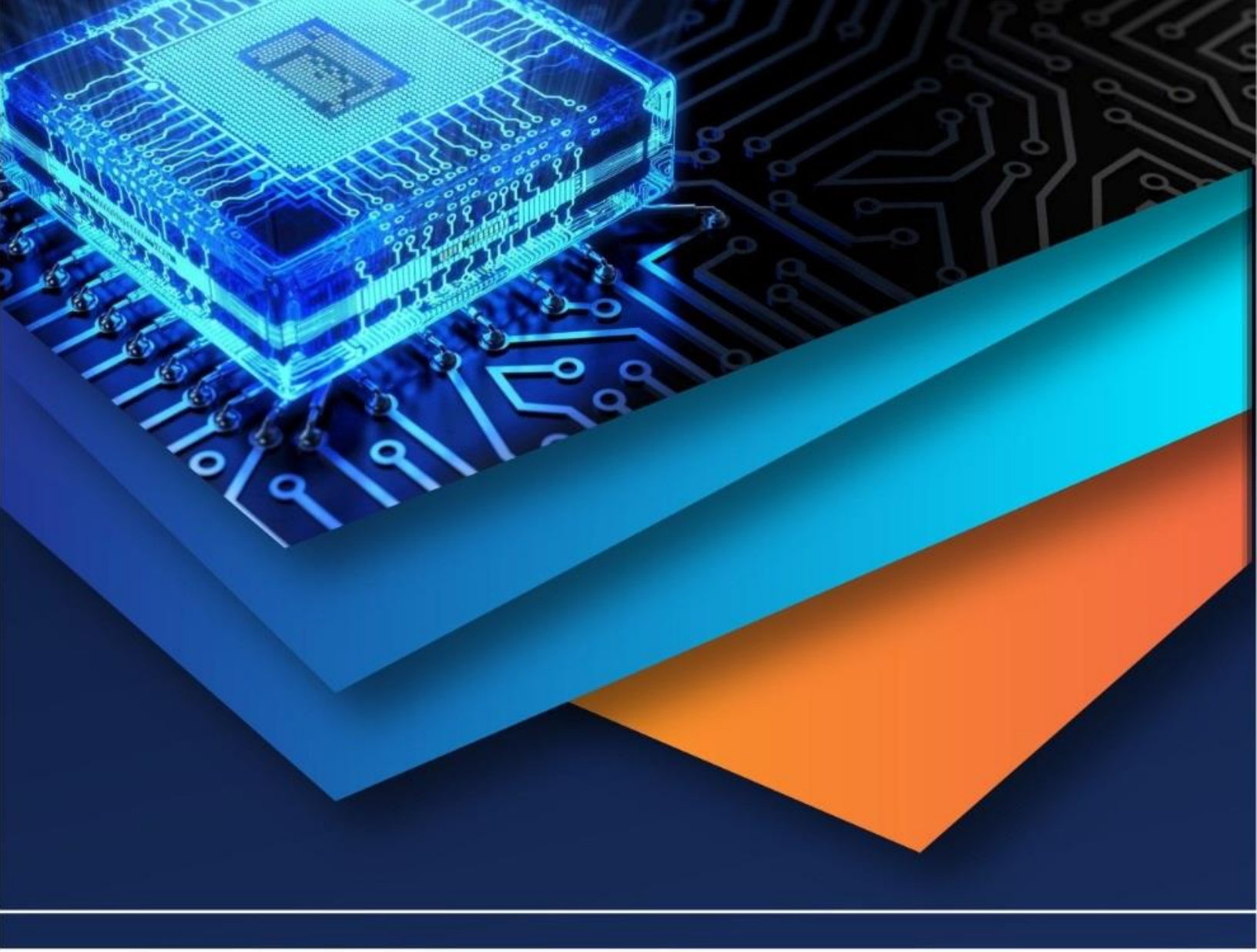
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