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Review on IoT for Indian Farmers

Heena M. Sangtrash , Anand S. Hiremath

Department of Computer Science and Technology, BLDEA'S College of Engineering and Technology, Vijayapura, Karnataka, India

ABSTRACT

India is a land of versatile soils and different weather conditions. Due to sudden rain and without accurate weather forecast, Indian farmers face problems such as damage of the already grown crops in their field. And even the Indian farmers does not have a sufficient knowledge about their soil. Due to change in the structure of soil because of different weather condition, farmers are not well aware of which crop will be optimally suited to be grown in such soil. These are some of the problems that farmers face. IoT device is used for solving such issues for Indian farmers. The solution proposed for this will report any precautionary steps to be taken for farmers using a centralized data server which analysis the data and notifies farmer. The solution also has portable IoT device and hence in any rural areas it can be implemented.

Keywords: Internet of Things (IoT), Decision Support System (DSS), Application Program Interface (API)

I. INTRODUCTION

In India 5,650 farmer suicide rate was reported by National Crime Records Bureau in the year 2014. From 2005 there are l.4 to l.8 suicide rate been reported in l00,000 total population. India has Farming as major occupation so this suicide rate is huge for country like India. India is also the big contributor in the world food market and hence it is necessary to use available technologies for the benefits of Indian farmers so as to control the suicide rate. In [l] sensor network is used to connect to the real world object of agriculture. In [2] different technologies such as mobile computing, cloud computing, and agro cloud back so are used.

In [3] GPS and ZigBee technology is used for Wide Area Network(WAN) based humidity and soil temperature monitoring system to solve the soil problem agriculture. In [4] the soil properties is observed for prediction of information on crop cultivated using artificial neural networks

II. REVIEW OF LITERATURE SURVEY

To analyze and study more about the IoT for Indian farmers the following literature survey has been done.

In [1], To obtain the information and to organize them, IoT can change the ways by connecting real world objects with each other. To connect to the agriculture, sensor networks is used, which allows to create connections regardless of geographic distances among agronomists, farmers and crops. To improve the farming practice and better understanding of crops these connections can be used by the agronomists. To connect agricultural field to IoT sensor network is used. For this design reliability, management, and low cost are considered.

In [2], Although only few of the countries have adopted agriculture; but for better production with low cost the modern technologies should be used for agriculture industry in India. For storing details of soil properties of the land, farmers AgroCloud storage has been used. With the use of IoT, the properties of soil and environment is sent to AgroCloud periodically. For the total production, requirements of market and

fertilizer requirement Bigdata analysis on AgroCloud data is done.

In [3], As the rain water is unevenly distributed, the water distribution in agriculture field or according to the requirement of the crop is not easy to control. For different structure of soil and weather conditions, no ideal irrigation method is used. Because of wrong weather prediction and not proper irrigation methods, farmers suffer huge financial losses. The field parameters of Global Positioning System (GPS) is sent to central monitoring system using wireless sensor network which is connected to a central node using ZigBee.

In [4], By considering different climate situations which affect the local weather conditions in the various parts of the world, which directly effects the crop yield. Artificial neural networks is used for crop prediction which is a methodology that is used to predict that which crop is suitable for field by sensing the different parameters of soil as well as parameters that are related to the atmosphere. These parameters include like manganese, PH, phosphate, type of soil, nitrogen, humidity, potassium, iron, rainfall, depth etc.

In [5], In wireless sensor network the TCP/IP application layer is reused by IPv6 protocol. For wireless sensor network the Simple Network Management Protocol can be used on the internet for monitoring and managing hosts. For the resource constrained networks the IETF constrained application protocol is used as the open application layer. In this comparision of CoAP and SNMP based WSN is done for monitoring these approaches in the agricultural field that is connected to the ERNET IPv6. After comparision of these two approaches, it is provided in terms of ease of use, and memory footprint.

In [6], In domains of water, agriculture, health, education and transport etc., similar kind of issues are faced by rural areas in South Zambia and Africa. To solve these issues similar solutions can be used. The intention is to use internet of things technologies (IoT) to solve these issues in rural areas, as well as in agriculture. In the field of agriculture IoT can be used to diminish the issues use in the areas of weather forecasting, rural financing, wild life management, and crop farming.

In [7], Agriculture provides necessary resources to humans such as fiber, energy and food, and hence agriculture is the most important industries in human history. Therefore by using the new technologies the agriculture industry can be further enhanced, particularly by Internet of Things (IoT). For providing the smart farm system to the end users a connected farm based on IoT systems is used.

In [8], Due to increase population, issues such as food safety, environmental impact and animal welfare, agriculture faces many difficulties like water shortage, climate change, and labor shortages. To optimally and profitably use land and water resources is crucial as humans depends on water and agriculture for survival. At the CSIRO, the smart farming is developing for these requirements that uses wireless sensor network technology for agriculture. It has self configuration network which is cheap, the environment condition is known by the simple devices and it is used for field and other beneficial purposes.

In [9], MEMS technology for PI with cavity structure for high sensitivity capacitive humidity sensor is used which consists of the sensing layer, bottom electrode, the comb shaped top electrode having branches and substrate with a cavity. For improving reliability and to protect sensing material the cavity structure of substrate is used. Because of the low hysteresis, high resistance and high sensitivity to most of the chemicals, PI is used in the sensing layer. The structure can help to improve the response time as well as sensitivity of the sensor of the humidity due the contact between the vapor and PI, it has short path for vapor absorption.

In [10], For human motion localization to improve the localization performance pyroelectric infrared with sensor arrays is used. To solve this optimal design problem, Genetic algorithm based on Divide and conquer is used. It has three steps: first using the divide and conquer's principle, problem is divided into sub optimization problem. Second step is to solve this sub-optimization problem using standard genetic algorithm. Finally, optimal solution can be obtained by combining results of sub optimization problems.

In [11], IEEE 802.15.4, having the wireless link for low power personal area networks which is implemented by radio manufacturers. To improve the structural monitoring for tracking, building and agricultural yields etc, 802.15.4 is used in embedded applications. These kind of applications usually need a number of nodes with low costs that communicates and cover large geographical area, it must work on modest batteries for years..

In [12], In India Agriculture is the major source for the largest population to earn money and to carry out their livelihood. India is said as the land of Agriculture, and hence the main source of income in India is the agriculture. People tried to make maximum profit by communicating with each other and sources to grow crops, harvest and sell them in the market. But, for centuries the farmers have grown same crops, as the knowledge of them is not enough. And the final outcome is affected by the weather conditions, diseases, pests and soil fertility etc. Hence to increase and for better production of crops Internet of Thing (IOT) and cloud computing technologies should be included. So as to collect the information by connecting to the devices.

In [13], Precision agriculture has been applied to soil fertility management which is an important area. The main objective is predicting the soil chemical attributes through spectral responses. To study this 1,000 ha area is used located in Uberlandia, Brazil. The soil is collected at three different depths by which thirty sampling points are established. Physical and chemical analyzation of the samples is done and the data is obtained in 400 to 2500 nm range. Multiple equations can be generated for summation of cation exchange capaciticies, bases, P, Ca, Al, H, aluminum saturation, base saturation, pH, K, and Mg these all are from using 60 soil samples. Then the determined values is compared with these values by conventional analysis

In [14], For the agricultural soil evaluation, Discriminant and Correlation analysis is used via chemical parameters of the soil which is taken from different villages of Kheda district of Gujarat state in India. The primary focus is to randomly select 51 samples of soil and to study on it. These soil samples are collected from the authorized locally trained farmers under the soil health card program of government of Gujarat, and these sample are tested in laboratory for the soil test, and this is done by using standard methods for the quality of soil analysis. Then the evaluation of relationship between macro nutrients and is done using Pearson's correlation analysis.

In [15], For the overall socioeconomic development of the India agriculture plays an important role. Productivity of the Indian farm is below compared to other nations despite of attaining self sufficiency in food staples. This is because not adapting technologies and agricultural practices and high costs. Increase in the yield of crops is because of the use of commercial K, N, and P fertilizers. But excess use of these fertilizers can contaminate groundwater and surface. In cultivating crop many stages are there with each stage requiring different nutrients. Hence the farmers needs to monitor these fields and spend lot of time in it. As the excess or less use of nutrient will affect the productivity, To measure the soil nutrients WSN technology and different techniques are used.

In [16], With large amount of data, it is difficult to get the desire information from it. Applications of data mining techniques is used in the field of agriculture. For the agriculture labour, land, organization and capital are required for productivity. In case for the understandability of pattern of human interaction and incomplete data, to handle these issues Fuzzy sets are suitable, which provide the faster solutions. With this data yield prediction is done which is very important problem of agriculture for farmers. By using data mining techniques yield prediction problem can be solved. To achieve high accuracy for the yield prediction, different data mining techniques and their types are evaluated on the different data sets.

III. CONCLUSION

In the Indian economy Agriculture plays an important role. For the increase in crop production efficiency and farmer life, IoT plays a vital role. For the efficient and better decisions for farmers, educating them with visual alerts is necessary. The data points can be analyzed by different devices connected with each other.

The soil properties and the best crop suited for the soil, these things Indian farmers are still unfamiliar with. To enhance the yield, IoT device can be used which can easily know details of the soil, fertilizer and water level that are required for the field, The visual alert in the farmers own language helps in weather forecasting and theft protection which is another advantage.

Further, the aim is to develop and actual implement this product on a particular agricultural land.

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