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iFarm: Development of Iot-based system for Agriculture

[1]Shrey Agarwal, [2]Dr. R. Jebakumar

ABSTRACT - *Quality agriculture is aimed at elevating the management of farming and it requires the data of the work of agriculture. Farmers traditionally write data on a piece of paper but it is problematic along with tiresome to examine the agricultural statistics of the past and then supervise the amount of products of agriculture. The whole system contains IOT device, Web browsers and a cloud server. The IOT sensor will be placed in the farm. The hardware part will be the IOT sensor and the software part would be the cloud server and the database. These IOT devices will automatically transfer the data over the web server.*

Keywords *- Agriculture, IOT, Cloud server, Web Browser.*

I. INTRODUCTION

Cloud computing is a very vast and evolving technology which has several uses in the development of our country. Today, almost everybody is using cloud computing in many forms and without it, it will be very difficult. Companies in the real world are using it as one of their essential components. The technology comprises of the data storage and the power of computing which are the most important parts and these parts make it more interesting and essential. The storage devices, mass-storage networks and the cheap computers along with the acquisition of the hardware virtualization across the world has led to the growth of the cloud computing. There are many uses of cloud computing in the field of agriculture too. To help the growth of agriculture in India and enhance the ability of farmers in their field, a system is proposed called "iFarm: Development of Iot-based system for Agriculture".

Farmers on their farms can easily see to the job strategy. The system has three components in it which are- an IOT device, web server and web browser. The IOT device is the most important part of it.

The IOT device will be placed in the farm itself which will automatically collect the data from the farm without any input of the farmer. This data will be automatically transferred over the web server. The people (specialists) can see the data using a specific URL with the help of a web browser. They can evaluate the records and measure agricultural amounts and then design the work strategy according to their analysis. This work strategy can be told to the farmers. The farmers can look onto that strategy and implement that strategy on their farms. This will help the farmers also as they are getting the advice from the specialists. This will enhance their cultivation and will produce better results as well.

[1] Department of Computer Science and Engineering, SRMIST, Kattankulathur,Chennai, Tamil Nadu, India, a.shrey9@gmail.com

[2] Department of Computer Science and Engineering, SRMIST, Kattankulathur,Chennai, Tamil Nadu, India, jebakumar.r@ktr.srmuniv.ac.in

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II. RELATED WORK

IFarm contains three segments: mobile phone function with an internet network facility, a cloud server, and a Web browser. Farmers on their fields can check up the information through the work plans and deliver the reports of the field to the office using the mobile phone application over the internet. The data is stored over the web server and can be accessed anywhere anytime. The Web browser is worn to administer the data and supervision amounts. The web browser is accessible on a mobile phone, a tablet, or a personal computer using an internet connection [1].

The author suggested remote practise in the agriculture activities using data acquired by the sensor and the multimedia data [2]. The accuracy of agricultural activity detection is improved by the crop protocol. In this paper, a structure to define the plucking performance of a tea-worker is proposed. It is done by wearing a system in the wrist borne. The records that is used for study is acquired from two tea estates consisting of a broad figure of tea workers working in the various parts of the tea estate. A batch of fifty workers is assigned a manager whose see the work of these fifty workers and also ensures that they are plucking the leaves correctly and at the right amount of speed also. The speed should be of the right amount as slow speed can result in the low productivity and high speed can decrease the quality of leaves. A large amount of leaves should also be not held for long as holding the leaves in hand for a longer period of time presses the leaves and as a result the trait of eventual tea drink formed is decreased. The manager has a handful of other tasks too like controlling the end count of the leaf and also the heft of the tea leaves gathered finally in the end of the day.

In [3] The author proposes a system where it monitors and controls the irrigation. In this, a wireless sensor network is used to supervise the conditions of the environment like the humidity, water level and temperature of regulating the irrigation. The system uses two modes which are automatic and manual mode. The data is uploaded on the cloud server time-to-time and the data is used for the decision making and regulating the work flow. The controlling activities used in the farm can be supervised by the user and the irrigation can also be controlled as well by the user. This can be done with the help of an android app installed on the mobile phone of the farmer.

Agricultural Management using Cloud Computing in India. ICT has a critical aspect and an adequate system of information that can used to expand the production of agriculture of India [4]. Contribution in building of the infrastructure of ICT and continuation of ICT is huge. Therefore, the demand is also high as the ICT is user-favourable and costing is less also. Also, ICT device can be used for agriculture region that can hold the raising the large volumes of data, extensibility, labour force and can help in compressing the gradual increase of the amount of food and energy, which are generated by elements like poor trade, market policy and population growth in the flourishing places. ICT has a lead factor in almost all the fields such as research and day-to-day activities such as financial services, medical imaging, transmission that is achieved by the service of flourishing technologies like cloud computing, machine learning and computer visio

The author emphasis more on the use of iFarm software e.Krishi, globally known as e.Agriculture and precision agriculture is a flourishing area where ICTs(Information and Communication technologies) such as Sensors, TV, PDAs, PCs, Cell phones, Radio can be used to help farmers by increasing their productivity [5]. This productivity can be increased if the farmers have access to basic information such as soil condition, crop

advice and weather forecasts, also allowing the farmers by authorizing connections with the makers of the policies and increase the rise of the business of the rural enterprises and agriculture with joining local producers(farmers) on the global retail.

Work hours spent, Cost of the seedlings, Gasoline cost, Vinyl cost and Names of workers, crops and fields [1]. The communication charges for wireless mobile networks (3G/4G/LTE) are presently very expensive.

The data used for analysis is collected from 2 tea estates with a large number of tea workers working in its numerous sections. Name of the worker, Leaves plucked, Rate of plucking, expected pluck count, Actual pluck count, System generated recommendations for worker[2]. Human activity detection in real time to help in farm management, remote training, monitoring, and to provide real-time guidance to the farmers towards precision farming is a huge challenge which has not been adequately explored.

Records of agricultural workis done by the authors [3]. The communication charges for wireless mobile networks (3G/4G/LTE) are presently very expensive.

Cost, service time, agility and suitability are measured based in Japan farms[4]. Cloud computing comes with the issue of privacy and security. Fall season and Spring season, Gender, Age, Major, Classification and College [5]. It is recommended that more in-depth questions be asked of the students in regards to their opinions about the iFARM modules [5], context specific, on an individual module basis.

III. ARCHITECTURE

The ifarm system is made up. It consists a web server, IOT sensors and a web browser. The software would be the cloud server and the web browser and the hardware part would be the IOT sensor. So, the proposed system will have the same application but the data will be transmitted automatically and the farmers need not to do anything in this and they will be given advice for further production. The model consists of various separate modules and it defined in fig.1.

IOT SENSOR

IOT sensor will be placed in the farm. It will send the data automatically over the cloud server at some specific time intervals. The IOT sensor contains three sensors in it namely temperature, humidity and Ph. It will be connected through the WI-FI or the mobile internet connection. It is done by using the embedded C language.

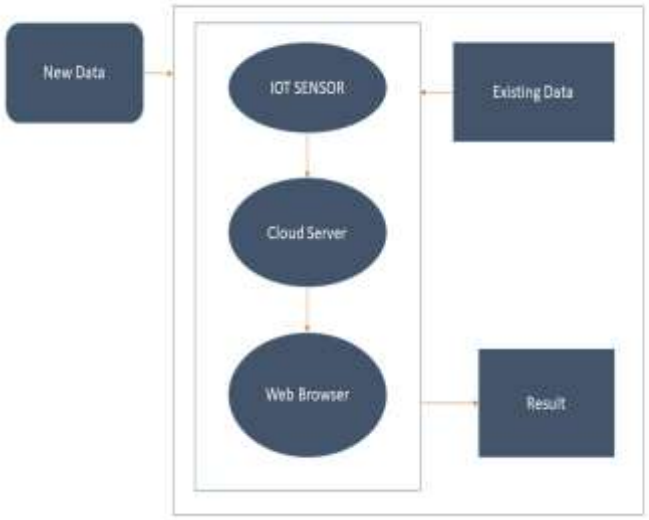

Figure 1: Architecture Diagram

CLOUD SERVER

The cloud server is responsible for the transmission of the data through the internet over a URL so that the user can access the data of the farm through that URL.

Web Browse

The Web Browser is responsible for viewing the data of the farm sent by the cloud server. The specific URL is opened and the data is viewed. This data is evaluated by a team of experts who study the data and thus give their reports and expert comments on the data to the farmer.

IV. TECHNOLOGIES USED

To implement the model, various technologies were used in this proposed model.

ARDUINO CONTROLLER

Arduino controller is a digital device which can control and sense physically and digitally as well. It contains set of digital and analog I/O pins that are joined with expansion boards. The Arduino controller uses the embedded C language. Embedded C language is a language that provides the development of the programs for embedded services. It contains the sensor module present in it. The sensor module contains various sensors that are used to measure the different properties of the farm of the farmer.

The various sensors are-

Temperature Sensor:

It measures the temperature of the soil. The latest version used is the LM35 series.

Water Level Sensor:

It measures the water level of the soil. It has 3 LEDs and one LCD display also.

pH Sensor:

It measures the quality of water. It is connected to the Arduino controller through the BNC connector.

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LDR Sensor:

The Light Dependant Resistor measures the intensity of light in the environment. It gives out analog voltage as output. The voltage is directly proportional to the intensity of sunlight i.e. as the level of intensity of the light increases, the analog voltage emitted out also increases. As it emits analog voltage, therefore it is necessary to connect it with the analog input pin of the Arduino controller. The analog voltage is then converted to digital value by the Arduino with its in-built ADC (analog to digital convertor) and is normally in the range of 800-1023.

NODEMCU:

Once the values are collected by the Arduino controller, they are sent to the web server with the help of NodeMCU. It is an open-source IOT-platform which comprises a firmware. The firmware runs on ESP8266 Wi-Fi SoC from the Expressif Systems and the hardware which runs on the ESP-12 module. Through this ESP8266, it establishes the WI-FI connection. The wi-fi connection is then connected through the mobile hotspot. Thus the connection is made and the values fetched by the Arduino controller are sent over the web server and uploaded in the database.

PHP:

The values are stored in the database using PHP (Hypertext Preprocessor). The values which are sent over to the web server are collected using PHP and inserted in the database. The database used is SQLite. Once, the values are stored, they can be viewed through the server by simply typing a URL in the web browser. Iotclouds is used as a server.

V. RESULT AND DISCUSSION

To implement the model, model uses IOT sensor. The data will be transmitted automatically and the data then can be viewed by the specialists through the help of a specific URL which can be accessed by the web browser. The data transmitted will consist of the temperature, humidity and PH. These things will be processed by the team and then they will give their advice to the farmers. It is expected that the model will produce fruit full results and thus benefit the farmer. It will also introduce them with the upcoming technologies and help them adopt the technologies to their extent. This model will also help in the development of the Indian economy and thus the rise in the GDP also.

VI. CONCLUSION

The system helps many farmers to administer agricultural job to achieve cost-effective rigor agriculture. The system is useful but the cost of IOT sensors to be placed in the farm will be high so most likely, the farmers cannot afford such high cost sensor. So, the cost of this IOT sensor will have to be held by the government only. Also, the internet costs or the wifi cost can be afforded by the farmer as this system will produce a far better result than what they are getting now but the farmers needed to be convinced and taught properly by the

specialists so that they can understand the use of this system and allow the implementation of this system in their farms.

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