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# Review on IoT based Smart Agriculture System

Kajal N. Dhawale[1], Dr. Narendra G. Bawane[2]
[1]*M. Tech VLSI,* [2]*Principal, Jhulelal Institute of Technology, Nagpur, India*

***Abstract— Big amount of data is collected by the sensors from the end subsequently, this considerably big amount of data must be processed, analyzed and stored in a effective ways. In this manner, of computing resources and storage be provided to compute this large amount of data. To focus on introducing the latest technologies like as sensors, WSN to revise approaches to agriculture by collecting the data about the various parameters of soil, analyzes the data and performed the computations, giving the best optimal solutions for the farming. The application of computing in agricultural economy will open up a vast range of prospects, such as the vast storage of agriculture information, the cloud management of agricultural production process, the storage of agricultural economy information, early-warning and policy-making based on the agricultural products market, the tracing management of agricultural products quality by using IOT.***

***Keywords— Sensors, Computing Resources, WSN, IOT.***

## I. INTRODUCTION

Agriculture is the main support system of Indian economical growth. The most important barrier that arises in traditional farming is climate change. The number of effects of climate change includes heavy rainfall most intense storm and heat waves, less rainfall etc. due to these the productivity decrease to the major extent, to overcome this problem agricultural monitoring system plays an important role. The development of automatic agricultural system using IoT is new way of research in the field of agriculture. The sensor based feedback advisory system include many different types of sensors, such as temperature, humidity, soil moisture, canopy temperature, canopy humidity and wind velocity, placed on the field with data loggers to communicate the observations to the server and automatically operate according to that. Apart from sensor information the farmer uploads information about climatic conditions, soil conditions, rain, etc.

The classification and modelling of agricultural events, modelling of the agricultural experiences, and a method to browse through the history of agriculture experiences soil type, crop, crop variety, season, target, and if available fertility status. In the challenges involved in the developments of decision support system to be used by farmers as end user are presented, however aims to bridge the gap between farmers, agricultural experts, financial institutions, soil testing labs, agriculture market and other agriculture related institutions. We propose a novel experiential computing approach which aims to provide more insights to an expert by capturing, detecting, storing and analyzing the history of various events in agriculture. These are some methods that have been used so far to improve irrigation system, decrease crop wastage and increase crop productivity. In this work the system is developed using sensors to monitor crop- field and automate operating system.

## II. LITERATURE SURVEY

Bhushan G. Jagyasi, Arun K. Pande, Ramesh Jain Event based Experiential Computing in "Agro-Advisory System for Rural Farmers", Wireless Communication©2017 IEEE. This paper has presented late blight disease forecasting protocol; by integrating sensor based mathematical disease forecasting models, with human participatory diagnosis using mobile phone application overlay mKRISHI system[1]. "IoT Based Monitoring System in Smart Agriculture", International Conference on Recent Advances in Electronics and Communication Technology, 2017. Smart agriculture using IoT, monitoring environmental factors is the major factor to improve the yield of the efficient crops. The feature of this paper includes monitoring temperature and humidity in agricultural field through sensors using CC3200 single chip. Camera is interfaced with CC3200 to capture images and send that pictures through MMS to farmers mobile using Wi-Fi[2]. Smart Agriculture System based on IoT and its Social Impact, International Journal of Computer Applications (0975-8887), Vol. 176- No. 1, October 2017.The smart irrigation system using control based on real time field data and updating with temperature maintenance, humidity maintenance and other environmental parameter is discussed[3]. Development of IoT based Smart Security and Monitoring Devices for Agriculture, 6$^{th}$ International Conference - Cloud System and Big Data Engineering,978-1-4673-8203-8/16, 2016 IEEE. The integration of traditional methodology with latest technologies as Internet of Things and Wireless Sensor Networks can lead to agricultural modernization. This device can be controlled and monitored

from remote location and it can be implemented in agricultural fields, grain stores and cold stores for security purpose. This paper is oriented to solve such problems like identification of rodents, threats to crops and delivering real time notification based on information analysis and processing without human intervention. In this device, mentioned sensors and electronic devices are integrated using Python scripts[4]. A Control System in an Intelligent Farming by using Arduino Technology", 5th ICT-ISPC, 2016.This paper has covered Intelligent Farming is the technology that uses the concepts of IoT and smart farming to help farmers to monitor and sense useful information from their farms in order to help on the quality improvement and product quality with the help of sensors[5]. A Study on Development a Smart Environment in Agricultural Irrigation Technique", IJASA Vol.3, No.2/3, September 2015.This paper has given various types of sensors in the crop field area, temperature and moisture value of soil is monitored. Based on the sensed data system will automatically decided about the necessary action for irrigation and also notifies the user[6]. Intelligent Monitoring & Controlling Of Agricultural Field Parameters Using Zigbee**",** IJITE Vol.03 Issue-01, January 2015. In this paper has discussed a smart wireless sensor network (WSN) for an agricultural environment. Monitoring agricultural environment for various factors such as temperature and carbon monoxide along with other factors can be of significance[7]. Real Time Automation of Agricultural Environment", International Conference for Convergence Technology- 2014. The system useful for monitoring the soil moisture condition of the farm as well as controlling the soil moisture by monitoring the level of water in the water source and accordingly switching the motor ON/OFF for irrigation purposes is covered[8]. Agricultural Production System based on IoT, IEEE 16th International Conference, 2013. The IoT based agricultural production system for stabilizing supply and demand of agricultural productions while developing the environment sensors and prediction system for growth and production amount of crops by gathering its environment information is described[9]. Mobile phone based agro-advisory system for agricultural challenges in rural India, IEEE Conference on Technology for Humanitarian Challenges, Aug 2009. This paper studied the benefits of the use of mobile phone ICT technology and how the farmers of rural area are getting advantages by using mobile phone agriculture applications in developing countries. Now a-days mobile phone application developer companies are also focusing to design user friendly application as per the requirement of the rural farmers. That application is useful for advice farmer related to their farm[10].

## III. RESEARCH METHODOLOGY

The project aim is to provide live information related to farm, atmospheric condition and also provide automatic operating system to operate the field without applying manual efforts.

Followings are the main objectives of this project.

*A.* Review of existing IOT system available for intelligent farming.
*B.* Identify various sensors required for smart agriculture system.
*C.* Develop IoT based system for intelligent farming.
*D.* Gets necessary information from cloud for better decision making for crop management

## IV. EXISTING SYSTEM

*A.* In the current scenario, farmers have very less knowledge about the soil and its parameters level, percentage of carbon, nitrogen, water absorbing capacity etc. which plays a very big role in the crop production.

*B.* Farmers are doing the farming based on traditional knowledge so it is difficult for the them to predict that which type of soil is suitable for which type of crop and because of insufficient knowledge farmers are facing loss in the crop production degrading the economical structure of the farmers.

*C.* As the scientific consensus grows that significant climate change, in particular increased temperatures and precipitation, is very likely to occur over the 21st century economic research has attempted to quantify the possible impacts of climate change on soil.

*D.* So, there is a need to design of performance monitoring unit for reconfigurable embedded processor.

## V. PROPOSED METHODOLOGY

The proposed system as shown in figure 1 will be to developed for centralize monitoring and control for the agriculture land. This can be managed and functioned from any location wirelessly using a mobile device. The application user can control basic operations of collection of environmental, soil, fertilization, and irrigation data automatically and action taken by the system automatically. The perspective of assessing crop performance, compute crop forecasts and personalize crop recommendations for any particular farm using the application.

The main block of the proposed system shown in fig. 1 is microcontroller. It is portable, low power for battery-operated, secure

and fast connection. Environmental conditions variations will affect the overall yield of the crop. Plants require proper very specific conditions for optimal growth and health. Monitoring the condition of crop field is very much necessary so sensors are used. Temperature infrared thermopile sensor is used; it has built in digital control and math engine. It senses the temperature values in real time and humidity sensor track the relative moisture of air within the farming field.

Firstly, the microcontroller will check for three conditions:

Availability of adequate water level in the water source.

Availability of continuous power supply.

Moisture level in the soil.

When there is no power supply available at the farm.

If there is need of fertilizer, pesticide, etc.

Data from all these nodes is collected and transferred to a cloud. Here, we are using the cloud service as a storage database. The Data sent to the cloud is stored in the cloud database. The data from the cloud is given to the mobile application. With the help of the mobile application the farmers get ease to control various devices and record the readings from the sensors. The system also focuses on reducing the cost and energy consumption during the process. The entire field is embedded with sensor nodes including soil moisture sensors, humidity sensors, soil Ph sensor, controller node, solar panels, irrigation sprinkler and control valves.

If the moisture value and the humidity value is less than the prescribed value then the system will decide to open the valves. The valves in the pipe will open and then automatically operate and closed. As the entire system will be triggered for every 1 hour, it is more sufficient for a plant to maintain the moisture required for it.

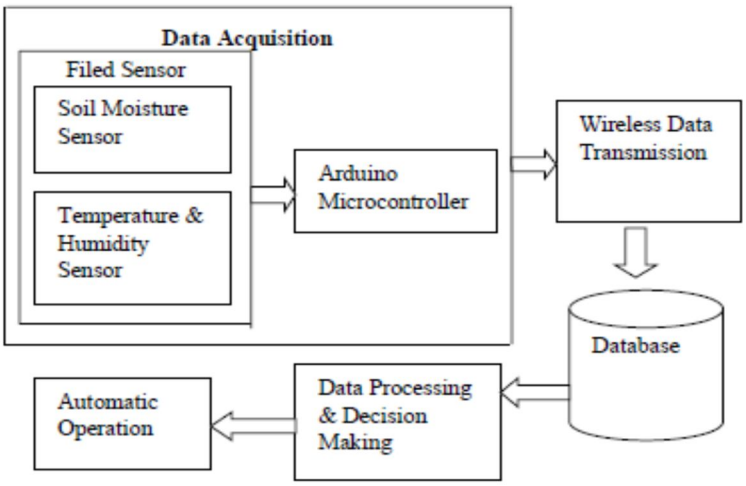


Fig. 1 Block diagram of proposed system

If the moisture level in the soil falls to the lowest level then the microcontroller will check the above mentioned 1st two conditions& will turn ON the motor for irrigation of the farm. The motor will be turned OFF by the microcontroller as soon as the soil moisture sensor indicates adequate availability of moisture in the soil. Turning OFF the motor will stop the irrigation of the farm.

The farmer will be informed via an SMS if the following conditions occur:

When the moisture level of the soil is the least.

The water level in the water source has reached the minimum level.

When there is no power supply available at the farm.

If there is need of fertilizer, pesticide, etc.

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Also, the water level sensor in the tank will monitor the water level inside the tank and if it is lower than the necessary parameter, the system will start the motor to pump the water from the well. For all the events, the information about the status of the water level, motor on/off, moisture and temperature level will be notified to the user via SMS.

## VI. CONCLUSION

This research focuses on developing devices and tools to manage, display and alert the warnings using the advantages of a wireless sensor network system in mesh topology. The system can work over far distances. The system uses arduino microcontroller and Xbee Wireless module base on the Zigbee standard. The developed system is very accurate. The developed system has core competency including Display weather information, and alert when weather conditions match using decision technique with weather information.

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