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SURVEY ON ADVANCED IOT BASED AGRICULTURE SYSTEM CONSISTING SMART WATER SUPPLY & CROP PREDICTION IN COST EFFICIENT WAY

Sneha Gavhane[1], Chaitali Istalkar[2], Punit Katariya[3], Surbhi Dahale[4], Prof. Nitin Shivale[5]
Department Of Computer Engineering, BSIOTR Wagholi, Pune[1,2,3,4,5]

Abstract: **Recent researches hypothetically showed the potential of Internet of Things (IOT) to change major industries for a better world, which includes its impact towards the agriculture industry. The farming yield prediction is the hardest task for agriculture offices over the globe. The farming yield relies upon different components. Especially nations like India, greater part of agriculture development relies upon downpour water, which is profoundly unpredictable. Agriculture development relies upon various parameters, in particular Water, Nitrogen, Weather, Soil attributes, Crop rotation, Soil moisture, and Surface temperature and Rain water and so on. In the past, yield prediction was performed by considering farmer's experience on particular field and crop. This research focuses on creation of a prediction model which may be used to future prediction of crop yield.**

Proposed framework is architected and intended to improve the effectiveness of agribusiness, fabricate a very much associated cultivating system and make an information sharing stage for farmers. In a more drawn out run, system will address two key issues tormenting farming in India – reaping water and groundwater, and foreseeing compelling usage of the equivalent. Primary point of this work to trim advancement at low amount water utilization, In request to concentrate on water accessible to the plants at the required time, for that reason the majority of the farmers squander parcel time in the fields. A proficient administration of water ought to be created and the framework circuit multifaceted nature to be diminished. The proposed framework created on the data sent from the sensors and gauge the amount of water required. In this paper, the hardware and software of the IOT for smart farming will be presented besides sharing the successful results.

Keywords: IOT, WIFI Module, Arduino, Irrigation, Farm Monitoring, Android App, Prediction, Soil fertility analysis.

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I INTRODUCTION

Consequently the proposed strategy goes for making farming shrewd utilizing computerization and IOT innovations. IOT empowers different applications crop development checking and choice, water system choice help, and so forth. The significant favorable position the framework is executing of Precision Agriculture with cloud figuring, that will upgrade the utilization of water composts while augmenting the yield of the harvests and furthermore will help in dissecting the climate states of the field. In this Paper, it is proposed to build up a Smart Agriculture System that utilizes focal points of forefront innovations, for example, Arduino, IOT and Wireless Sensor Network. The paper goes for making utilization of advancing innovation for example IOT and keen farming utilizing robotization. Checking natural conditions is the major factor to improve yield of the effective harvests.

In our paper, parcel of Explorative Data Analysis is done and different predictive models were planned. Further different regression models like Linear, Multiple Linear, Non-Linear models are tried for the compelling prediction or the conjecture of the farming yield for different harvests.

II LITERATURE SURVEY

Plenty of research work has been done to improve the performance of agriculture field. In [1] the system uses Arduino technology to control watering and roofing of the green house. It uses statistical data acquired from sensors (like temperature, humidity, moisture and light intensity sensors) compared with the weather forecast for decision making. Kalman filter is used to eliminate noise from the sensors.

Agriculture System (AgriSys) [2] uses temperature, pH, humidity sensors and the fuzzy inference to input the data from sensors. The system monitors the sensors information on LCD and PC. In [3] Wireless sensing Network with ZigBee technology helps to control air humidity, soil moisture and temperature. System is implemented with components as soil moisture sensor, humidity sensor, temperature sensor, ZigBee, 18F458 PIC Microcontroller, water pump, fan, relay and buzzer.

In paper [4], wireless sensor network is integrated with ZigBee to transmit soil moisture level and temperature values. The data is transmitted to a web server using GPRS through cellular network. The data monitoring can be achieved via internet using graphical application. In [5] the paper explains wireless sensor network for sensing soil moisture level, temperature and relative humidity values. Network lifetime of the node is increased by using sleep - wake up plan. The system in this paper implements clustering of nodes. Graphical user interface (GUI) is designed in MATLAB for data handling.

The paper [6] defines automation for remote agriculture having sensors and actuators connected to IOT gateway running OPC UA server. Cloud services (installing or configuring process controller) are used to change the control rules without updating firmware of remote sensors/actuators. In [7] WSNs integration with Cloud Computing is described. It provides performance comparison guideline for integrating WSN with Cloud Computing to improve performance and to overcome storage and energy constraints of WSN.

All the systems described above are similar in the context of wireless sensor node. The difference lies regarding the communication technologies and the storage of data collected from the nodes. Generally systems use one or more servers to store the collected data. When the quantity of nodes is increased, servers will need more space for storage, resulting in increased cost. This paper proposes irrigation system which describes the combination of the wireless sensor network, IOT communication technology and cloud server to accomplish performance of system and data storage. The proposed system provides remote monitoring and controlling of irrigation with real time sensing of atmospheric and soil conditions like air temperature, humidity and soil moisture. IOT based irrigation improves farm production without any human interference.

III PROPOSED SYSTEM

The element of this paper incorporates improvement of a framework which can screen temperature, moistness, dampness and even the development of creatures which may crush the harvests in farming field through sensors utilizing Arduino board and if there should be an occurrence of any inconsistency send a SMS warning just as a notice on the application created for the equivalent to the cell phone utilizing Wi-Fi/3G/4G. The framework has a duplex correspondence connect dependent on a cell Internet interface that takes into account information review and water system planning to be modified through an android application. In light of its vitality self-sufficiency and minimal effort, the framework has the potential to be valuable in water restricted topographically separated zones.

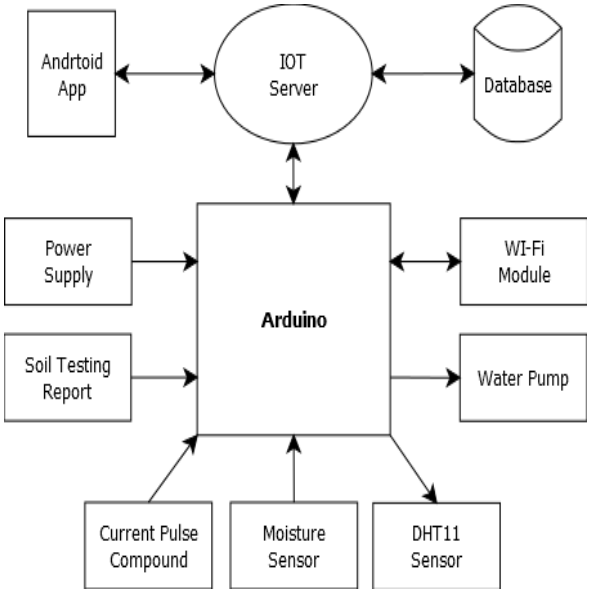

Figure 1: Proposed System Block Diagram

These results benefits information experts or information researchers or economic scientists to calculate and dispose of the gathering of factors utilized for creating models for prediction. A large portion of the regression techniques assist in making predictions.

Agriculture water system framework is created with low complex hardware. A two sensors are utilized proficiently those are temperature and moisture of soil in the circuit to get the aligned data to the framework. All perceptions and trial tests demonstrates that proposed is a finished answer for field exercises, water system issues, Implementation of such a framework in the field can improve the field of the harvests and by and large creation. With the assistance of this methodology the water system framework totally mechanized additionally gives constant data about the terrains and harvests that will enable farmers to settle on right choices. Distributed computing is “another style of figuring in which powerfully versatile and regularly virtualized assets are given as an administration over the Internet”.

IV ALGORITHM

1] Polling Algorithm

1. procedure polling controller
2. begin:
3. sensorValue readSensor();

4. sendMsgToServer(sensorV alue);
5. loop:
6. if resultAvailable() then
7. result readResult();
8. applyValue(result);
9. goto begin;
10. goto loop;

2] SVM Algorithm for Prediction

Support vector machine is another simple algorithm that every machine learning expert should have in his/her arsenal. SVM is highly preferred by many as it produces significant accuracy with less computation power. SVM can be used for both regression and classification tasks. But, it is widely used in classification objectives. The objective of the SVM algorithm is to find a hyperplane in an N-dimensional space that distinctly classifies the data points.

Input: soil, seeds

1. soil testing
2. add new seeds
3. add all features in vector x
4. for attribute in x do
5. hw, b(x) = g(z) here, z = (wTx + b)
6. if (z = 0)
7. assign g(z) = 1;
8. else g(z) = -1;
9. end if
10. end for

V RESULT ANALYSIS

Smart Agriculture using IOT framework is utilized to create choices with respect to water system utilizing constant information. Most importantly, farmer signs in to the framework utilizing username and password from an Android application. Framework is actualized in three stages.

- Detection
- Processing
- Information distribution

The detecting stage includes the detecting parameters which incorporate temperature, humidity, moisture, current pulse and motion. Every one of these sensors is connected to the Arduino microcontroller. This microcontroller goes about as the IOT gateway in the created framework as it has the ability to transmit the information to the cloud. This transmission is finished utilizing Wi-Fi ESP8266 module. The handling stage happens in the cloud. The cloud comprises of a Web Server, a database where the detected information is kept up and a decision logic which takes decision dependent on the detected information. In the data distribution stage, the output of the decision logic will be sent to the android application and after that to the IOT gateway.

The Smart Agriculture Application is created on Android. The highlights that are given in this application are as per the following:

- Determination to turn ON/OFF the water pump
- Determination of a water system (irrigation) profile i.e. the farmer can pick a period on a specific day to begin the water system and an opportunity to stop the water system.
- Identify the parameters which incorporate temperature, humidity, moisture, current pulse and motion.

Fertilizer	Values		Automatic	Manually	Result
	Previous Soil Testing Values	Standard Values			
N	150	450	300	400	100
P	60	172	112	150	148
K	50	115	65	80	75

Table: NPK Values

Our system will analyze the soil parameters and nutrients present in soil like NPK which will help to determine fertility level of that soil. Along with soil analysis our system will also predict the crops. System will also suggest list of fertilizers for that crop according to NPK values. Farmers can test the soil multiple number of times during cultivation process and take necessary precaution to get good yield. At the end reports will be generated so farmers can keep record of their fertility.

VI CONCLUSION

IOT based smart agriculture system can end up being exceptionally useful for farmers since over just as less water system isn't useful for farming. Edge esteems for climatic conditions like humidity, temperature, moisture can be fixed dependent on the ecological states of that specific area. The framework likewise faculties the intrusion of creatures which is an essential purpose behind decrease in harvests.

The two and three indicator formulas are helpful in the prediction of Agriculture crop Production-in-Tons.

This framework produces water system plan dependent on the detected ongoing information from field and information from the climate archive. This framework can suggest farmer whether, is there a requirement for water system. Persistent web network is required. This can be overwhelmed by stretching out the framework to send proposal by means of SMS to the farmer straightforwardly on his portable utilizing GSM module rather than versatile application.

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