SMART AGRICULTURE SYSTEM USING IoT

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Abstract : Farmers usually plan cultivation process based on their previous experiences. Due to the lack of precise knowledge about cultivation, they end up farming undesirable crops. To help farmers we are developing a System in which system will suggest crops according to weather conditions. The population also causes increasing water demand. Thus it leads to a crisis of water demand due to high water consumption. An Android application is created to assist monitoring of soil moisture, temperature and humidity. This application obtains data from the sensor which is connected to Arduino. If the level of sensor parameter is below to its preset data then and then only water will be supply to crops. In this application we can set timer for watering to plants for next day. This System also introducing Government Schemes for the farmers in application.

IndexTerms – **Climate, Sensors, climate, agricultural productivity, crop production, prediction, Internet of Things.**

I. INTRODUCTION

Internet of Things is widely used in connecting devices and collecting data information. IoT is used with IoT frameworks to handle and interact with data and information. IoT are applicable in various methodologies of agriculture. Applications of IoT are Smart Cities, Smart Environment, Smart Water, Smart Metering, Security and Emergency, Industrial Control, Smart Agriculture, Home Automation, e-Health etc. IoT is based on device which is capable of analyzing the sensed information and then transmitting it to the user.

Crop production is completely dependent upon geographical factors such as rainfall, soil type, temperature etc. These factors play a major role in increasing crop yield. In order to get the maximum plantation products and reducing water usage, the provision of water for the plantation cannot be less or more. The time of watering and the amount of water provided becomes a very serious problem. Each plant has its own characteristics in watering time and the amount of water required. Provision of water that is less or excessive in plants can cause plants to become dry or rotten. Soil quality, in terms of plantations can be determined by measuring various soil parameters. To obtain information about soil environment condition that approached the actual condition, soil parameter measurements are needed continuously. Parameter to be used in this thesis is the soil moisture. Each plant needs different soil moisture. That is why soil moisture information is indispensable in plantations. The combination of traditional methods with latest technologies as Internet of Things and Wireless Sensor Networks can lead to agricultural modernization. The Wireless Sensor Network which collects the data from different types of sensors and send it to the main server using wireless protocol. With the Internet technology, the information sent will be more real time and can be accessed every time. Therefore, the author tries to utilize sensor technology to conduct research and monitoring of soil moisture. Data will be taken from the sensor and received using Raspberry Pi which later can be monitored from Android-based devices.

II. RELATED WORK

Tahmid Shakoor, Karishma Rahman,Sumaiya NasrinRayta [1] The research suggests area based beneficial crop rank the cultivation process. It indicates the crops that are cost effective for cultivation area of land. To achieve these outcome, we are considering six major crops which are Aus rice, Aman rice, Boro rice, Potato, Jute and Wheat. The prediction is based on analyzing static set of data using Supervised Machine Learning techniques. This dataset contains past years data taken from the book according to the cultivation area. The research has an intent to use Decision Tree Learning-Iterative Dichotomiser 3 and K-Nearest Neighbors Regression.

NiketaGandhi,LeisaJ.Armstrong, OwaizPetkar, Amiya Kumar Tripathi [2] This paper discusses the experimental results obtained by applying SMO classifier using WEKA tool on dataset of 27 districts of Maharashtra. This dataset is available on Indian Government Records different parameters like precipitation minimum temperature ,average temperature, maximum temperature. reference crop evapo traspiration area, production, yield for kharif season is considered. The experimental result showed that the performance of other techniques like SMO.

S.Veenadhari,Dr.BharatMisra, Dr.CD Singh [3] In the present study a software tool named Crop Advisor has been developed as an user friendly webpage for predicting the influence of climatic parameters on the crop yields. C4.5 algorithm is used to find the most influencing climatic parameter on the crop yield of selected crops in selected districts of MP. Software indicates different hardware parameters on the crop yield, application of these input parameters varies with individual fields in space and time.

Nishit Jain, Amit Kumar, SahilGarud, Vishal Pradhan, PrajaktaKulkarni [4] we suggest a method which would help suggest the most suitable crop(s) which will maximize yield by summing up the analysis of all the affecting parameters. These affecting parameters can be economical, environmental as well as related to yield in nature. Economic factors such as market prices, demand etc. play a very significant role in deciding a crops as does the environmental factors such as rainfall, temperature,

soil type and its chemical composition and total produce. Therefore, its necessary to design a system taking into consideration all the affecting parameters for the better selection of crops which can be grown over the season.

III. PROPOSED WORK

1.PSEUDO CODE

```
Crop suggestion (weather condition)
Prediction(temp,humidity,moisture)
Getdata();
Temp=hardware data;
Humidity=hardware data;
Moisture=hardware data;
Arraylist<integer>=new arraylist<>();
Arrayvalue=K-means data;
If(temp==average;humi==avhumidity;Moisture==averagemoisture);
Croplot();
Select (string data);
Motoronoff(status);
If (motor==on)
{
Switch=OFF
}
Else
{
Switch=On
}
Checkcondition();
```

2.CROP SELECTION ALGORITHM

Stage 1: Identify the decision-maker(s):-based on the hardware data and preset data.
Stage 2: Identify the data : Utility depends on the context and purpose of the decision:-find the most accurate data.
Stage 3: Gather the data: This step would identify the outcomes of possible actions, a data gathering process:-At the data verification process.
Stage 4: Identify the criteria:-About the threshold values.
Stage 5: Assign values for each criteria:-In this stage data assignment is performed.
Stage 6: Assign weight to each of the criteria.
Stage 7: Calculate average of weight.
Stage 8: Make a provisional decision:-at preset data.
Stage 9: Perform sensitivity analysis:-after the k-means algorithm.

3.MONITORING AND WATERING ALGORITHM

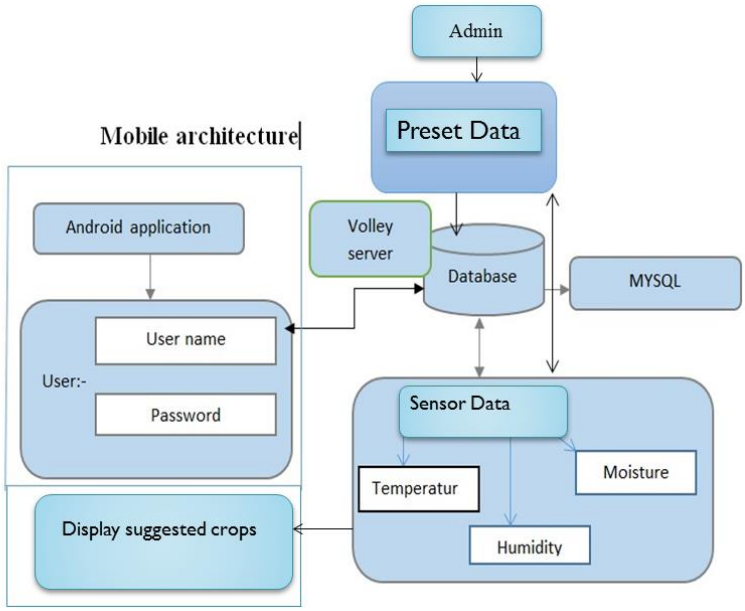
Stage1:Set preset data.
Stage 2:Collect hardware data/values.
Stage 3:Compare preset data and hardware data.
Stage 4:Arduino displays information about water level in soil on android application.
Stage 5: According to information user changes the motor status OFF/ON.

4.MONITORING AND NEXT DAY ACTIVITY ALGORITHM

Stage1:Set preset data.
Stage 2:Collect hardware data/values.
Stage 3:Compare preset data and hardware data.
Stage 4:If hardware values are less than preset data then arduino changes motor status OFF to ON according to time given by user.
Stage 5:Else arduino does not changes motor status.

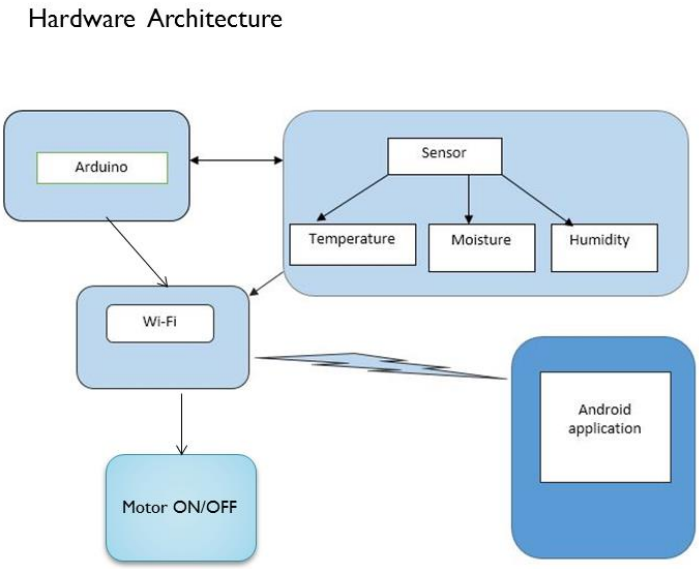
IV. ARCHITECTURE

1.MOBILE ARCHITECTURE



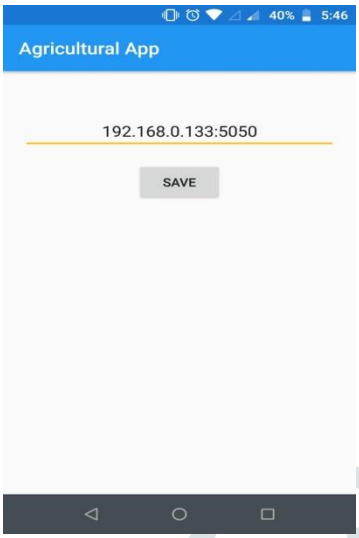
In this architecture, Admin set the preset data and stored in database. We are using MySQL database to store preset data and climate parameters. The user has android application and for security purpose we are providing registration, login and Ip address fields. It is act as middleware between application and database. Volley server is HTTP library which is used to transmit data over the network. Volley server makes networking faster it catches the data when user request the same data, instead of calling from server volley directly shows it from cache. Sensor data including humidity ,temperature, moisture parameters. Sensor data compared with preset data then the system suggest the suitable crop for particular cultivation area. User select crop according to their need and the whole information related to that crop will get displayed.

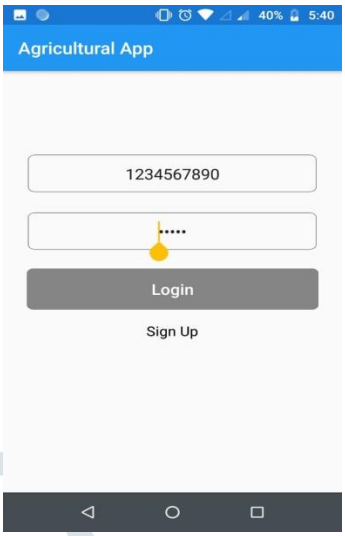
2.HARDWARE ARCHITECTURE

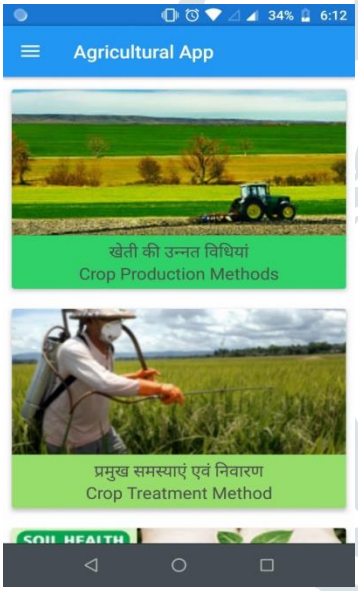


We are using sensors, Arduino and wifi. In our system we are using sensor which sense temperature, humidity, moisture values from weather of field. Arduino is receiving weather parameters from sensor. Data collected by Arduino will get upload on server through Wi-Fi. Admin will store preset dataset on server. Values collected from hardware get filtered with preset data set. After filtration crop suggestion will display according to weather parameters. Then user will select crop from suggestions to get it's information with it's process. After selecting any crop from suggestion user can see suggestion for crops which can plant with selected crop. After preset data and hardware parameters are compared then Arduino displays information about water level in soil on android application. According to information user changes the motor status OFF/ON. One another feature is monitoring and next day activity. For this feature after comparison If hardware values are less than preset data then arduino changes motor status OFF to ON according to time given by user.Else arduino does not changes motor status.

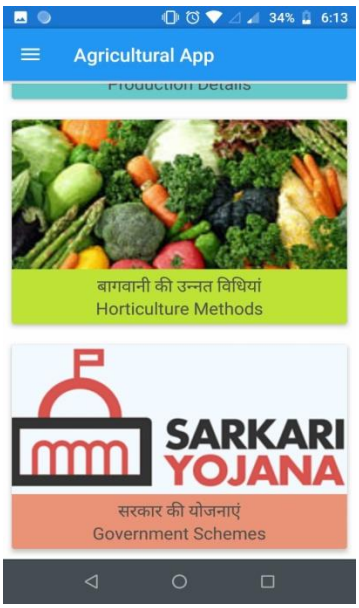
V. OUTCOME

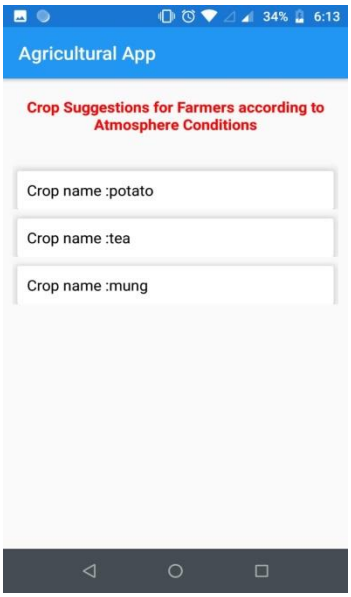

Agricultural App
192.168.0.133:5050
SAVE


Agricultural App
1234567890
Login
Sign Up


Agricultural App
खेती की उन्नत विधियां
Crop Production Methods
प्रमुख समस्याएं एवं निवारण
Crop Treatment Method


Agricultural App
SOIL HEALTH CARD
Swasth Dhara, Khet Haraa
मृदा स्वास्थ्य कार्ड
Soil Health Card
उत्पादन का विवरण
Production Details


Agricultural App
बागवानी की उन्नत विधियां
Horticulture Methods
SARKARI YOJANA
सरकार की योजनाएं
Government Schemes


Agricultural App
Crop Suggestions for Farmers according to Atmosphere Conditions
Crop name :potato
Crop name :tea
Crop name :mung

VI. FUTURE SCOPE

- Increase crop yield.
- To reduce wastage of water.
- Provide effective decision support system.
- Minimize cost.
- User friendly system.

VII. CONCLUSION

Investing huge amount of money in cultivating a crop selected by based on one's judgment on intuition should be considered as a medieval act in this era of technology.Thus the system will help to reduce the difficulties faced by the farmers and also reduce the wastage of water. The System will also help to monitor and manipulate the resources remotely which is deployed on farm. It will act as a medium to provide the farmers important information required to get high yield and thus maximize profits.

VIII. REFERENCES

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