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Soil quality monitoring, automated irrigation system using machine learning and Blynk

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ABSTRACT

India Ranks the second country in the world in farm output of 64% of cultivated land which depends on monsoons. Irrigation accounts for Fifty five to seventy five percent of water usage In the World. Also nearly sixty percent of this water while irrigation is wasted. So now we have to conserve the water by making use of soil moisture sensors resulting in smart water management Another is issue is people always focus on the crop yield whereas before the crop yield the other process such as soil quality and soil fertility, which crop to be grown and what fertilizers needed plays an very important role in the yield of the crop. So in our project we have focused on these factors such as irrigation, prediction for fertilizer and which crop to be grown. This project takes a real time data from the deployed sensors such as temperature, moister, npk and ph values in to account and predicts the output in iot machine learning environment. The system implemented will be introduced to the semi-supervised learning model where we will be applying algorithms such as knn and random forest and svm to predict fertility and where as for the crop along with this we have consider other factors such as season and place.

Keywords: *IoT, Soil Fertility, Ph Values, Microcontroller, Semi-Supervised Learning, Crop Prediction, Fertilizer Prediction Smart Water Management*

1. INTRODUCTION

The most important field of an Indian economy is Agriculture. Indian farming accounts for 18% of India's GDP and generates jobs for 50% of the country's labor force. In this new period, the farmer may use technologies to exert influence over the complexities of adjusting crop management and water usage. With both the advent of SaaS and cloud computing, farmers have received modern technology and resources to maximize their income, growing the number of discerning customers and unparalleled temperature values over the last few years. But as we can see that farmers still uses the traditional farming process to grow crop which results in low yield of the crops and fruits. Yet everywhere there was technology, and the mechanical equipment was substituted by humans. Many papers recommend utilizing devices that gather data from various forms of devices and then using a Wi-Fi to transfer them to servers in the cloud. The gathered data provide valuable knowledge on particular environmental factors, which requires control of the device in effect. Environmental management standards are not sufficient and systematic for increasing agricultural growth production. The other factors that can affect the efficiency significantly. Such factors include attacks on insects and rodents that can be tracked by splattering the field with the insecticides and pesticides required. Measurement of soil content such as N (nitrogen), P (phosphorus), and K (potassium) is needed to decide how much additional nutrient material needs to be applied to soil to improve crop fertility. Soil fertility sensors are used to monitor NPK. Nitrogen, phosphorus, and potassium are a significant component of soil fertilizer. Understanding the concentration of their soil will give rise to nutritional deficiency or excess of soil used to support plant growth. Moisture sensors are very important instruments for monitoring moisture in the area. Technically, the device is used to measure humidity in the atmosphere. A hygrometer measures measurements like humidity and ambient temperatures. The ratio of humidity in the air at a specified air temperature to the lowest humidity level is called relative humidity. The relative humidity becomes an important factor when seeking safety. Irrigation is the operation of regulated amounts of watering plants at the appropriate intervals. It helps cultivate field crops, preserve ecosystems, and vegetate deranged soils in desert regions even in less than normal cycles of rainfall. It has other agricultural development requirements, including preventing the freeze, rising weeds in grain fields, and avoiding soil acquisition. In agricultural growth Temperature plays a significant part. It has extreme effects on growth of the crop, yields and development, the occurrence of pests and diseases, need for water, and fertilizer are some of the 0 factors of environment lead to maximize crop production, , and yield. We're seeking to do the following in the whole of science. Data generation with IoT module for current soil parameters. Cloud storage to track application run-time internationally.

2. LITERATURE SURVEY

[1] As we know that cloud based and IoT technology is getting more and more better, we have to digitize the agricultural field using mobile applications. The key job is to collect data at a farm from various places. Such data would be made accessible through the cloud service to the farmers. You may access the data through a smart phone application. Not only can the data be given graphically, but the smart phone device can also include other useful resources for the farmers. [2]IoT, the concept of linking real-world artifacts with one another would fundamentally transform the way users organize, collect and ingest content.IoT allows for numerous applications in the Digital Agriculture environment, such as crop growth tracking and selection, irrigation decision support, etc. The Wireless Sensors Network (WSN) is commonly used to develop networks that enable decision taking. Such applications surmount several real-world challenges. Precision Agriculture (PA) is one of the most important fields in which decision-support systems are progressively required. Agriculture can be linked to IoT via sensor networks, which enables the formation of ties between agronomists, Farmers and grains, despite their spatial distinctions. With this method, which will offer real-time land and crop details to help farmers make the right choices.

[3]IoT is very much controlled by Asian scientists in agriculture and food, especially from China. In the implementation field the food supply chains are discussed most often, accompanied by farming. The reports suggest that IoT in the livestock and food fields is already in its infancy. [4] We make use of smart GPS based remote usage robot to conduct weeding, watering, detecting rain, scaring birds and wildlife, watchfulness etc.Intelligent irrigation with predictive monitoring and strategic decision-making focused on reliable real-time field data is the second and essentially intelligent warehouse management that involves warehouse temperature conservation, humidity conservation, and theft detection. Those operations will be operated by any remote smart device or machine linked to the Internet and the operations will be done through interfacing sensors, Wi-Fi or ZigBee devices, microcontroller and camera actuators, raspberry pi.

[5]Introduces similar Internet of Things innovations and aims to construct upon them a concept of the Agricultural Means of Production Supply Chain. That analyzes the role and utility of the internet of items that contribute to the supply chain's agricultural means of production. This article discusses the developments and opportunities of Internet of Things technologies in the Food Supply Chain for Agricultural Purposes.[6]Agricultural usage of wireless sensor network by the installation of two forms of nodes and the creation of a sensor network. The hardware architecture is composed of application process unit, radio module, sensor control matrix, data storage light, power supply package, analog interfaces, and expanded wireless interfaces. Computer system is TinyOS which consists of system kernel, computer drivers, and applications.

3. SYSTEM DESIGN

System Architecture design classifies global multimedia structure for the Application. The architecture design has been tied to the goal which is established for a Web app, hence the users that has to be presented, the users who shall visit the app, and the Navigation philosophy that is supposed to be navigated. Now the content architecture's main focus is in what manner the content objects are structured for their healthy presentation. Finally the Application architecture has been defined with the context of the developed atmosphere in which the feature has to be deployed.

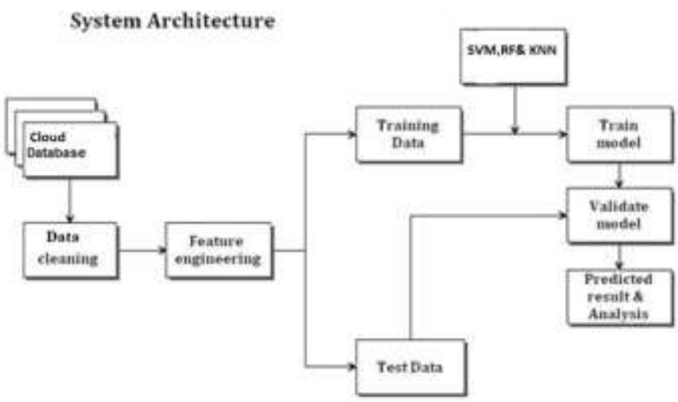

Fig: System Architecture

4. SYSTEM IMPLEMENTATION

System modules

It consists of four key components: field data SQLite, as well as sends data to server through web service. With standalone device, the latest analysis of anticipation of Soil moisture along with its effectiveness is displayed. (Standalone and WSN Scenario) collection device with relay switch Sensor data is uploaded to the cloud; the Blynk service is used to regulate the water motor; IoTenabled motor pump; predicting algorithms; approachable user interface for real-time monitoring. These components are divided into three tiers, The first one being Data collection and Transmission layer, the second one being Data processing, while the last tier is Application layer.

- **Field data collection:**
- A solo sensor node or a wireless sensor network will be deployed, depending on the field requirements.
- VH-400 Soil Moisture Sensor, Soil Temperature Sensor, DHT22 temperature and humidity sensor, and op amp are the four sensors in this kit.
- **Responsive user interface for real time monitoring:**
- Developed for irrigation activity monitoring and scheduling in real-time.
- Pictures real-time sensor data, expected soil moisture for the next several days, and precipitation data, as well as the ability to schedule irrigation.
- The irrigation can be set to start when the soil moisture level reaches a certain level.
- The system directs the threshold value to be maintained grounded on projected pattern of soil moisture and precipitation data.
- **Prediction using algorithms:**
- Based on data from field sensors, an algorithm has been built to anticipate which crop can be produced and what fertilizer is required for the specific soil.
- To save water and energy, irrigation recommendations are made based on the defined level of soil moisture and projected rainfall.
- Information can be retrieved by an algorithm and kept in a MySQL database on the server.
- Procedure contains details about crop forecasting and fertilizers for the following days.
- **Deploying Data to cloud**
- The acquired sensor data is uploaded to the cloud (Thingspeak) as a testing data set to the ml code using a cloud write API key.
- The ml model reads the live data set that has been published to the cloud from the sensor using a read API key, tests the dataset, and returns a response depending on the values.

5. RESULTS

Fig: Result-1

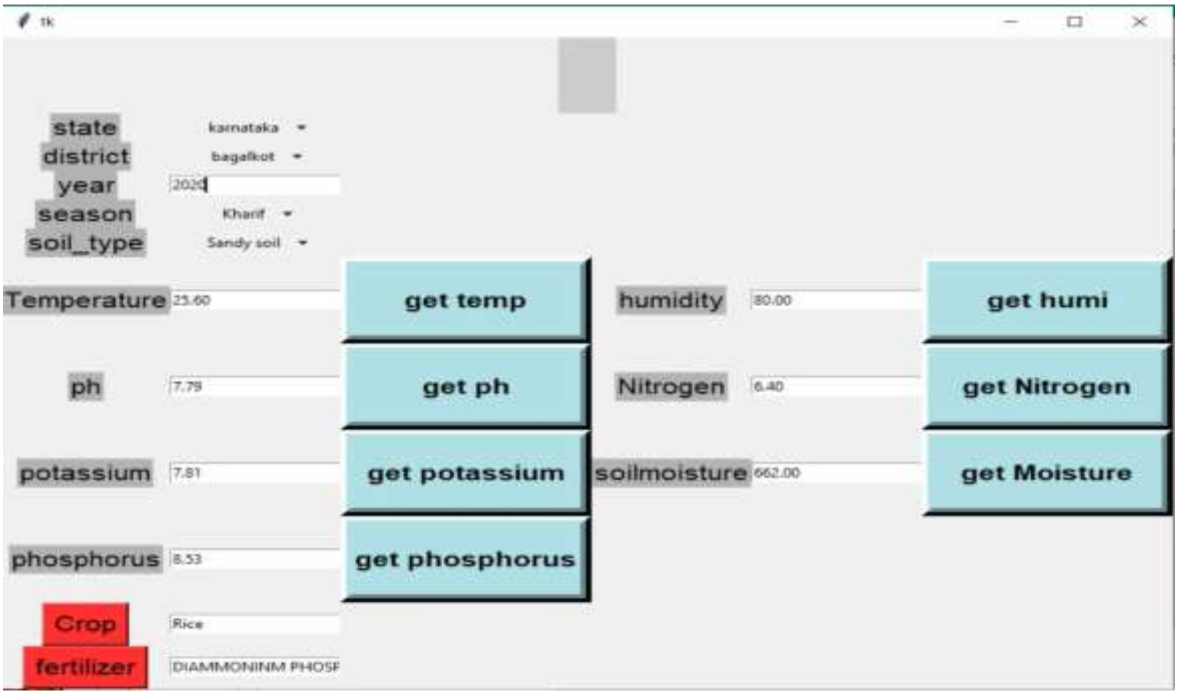

Fig: Web interface

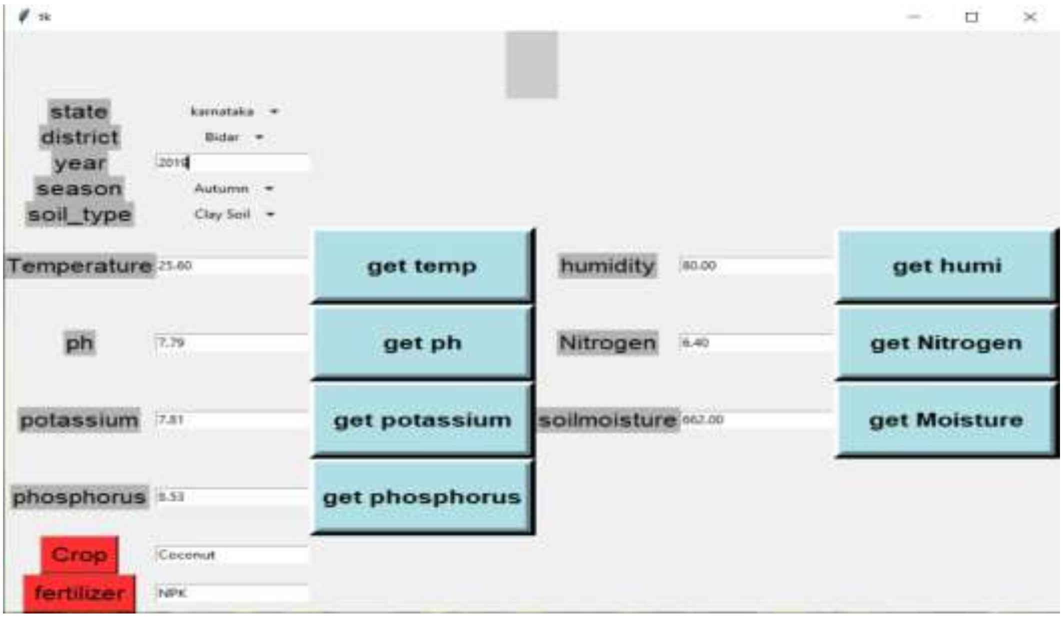

Fig: Result-2

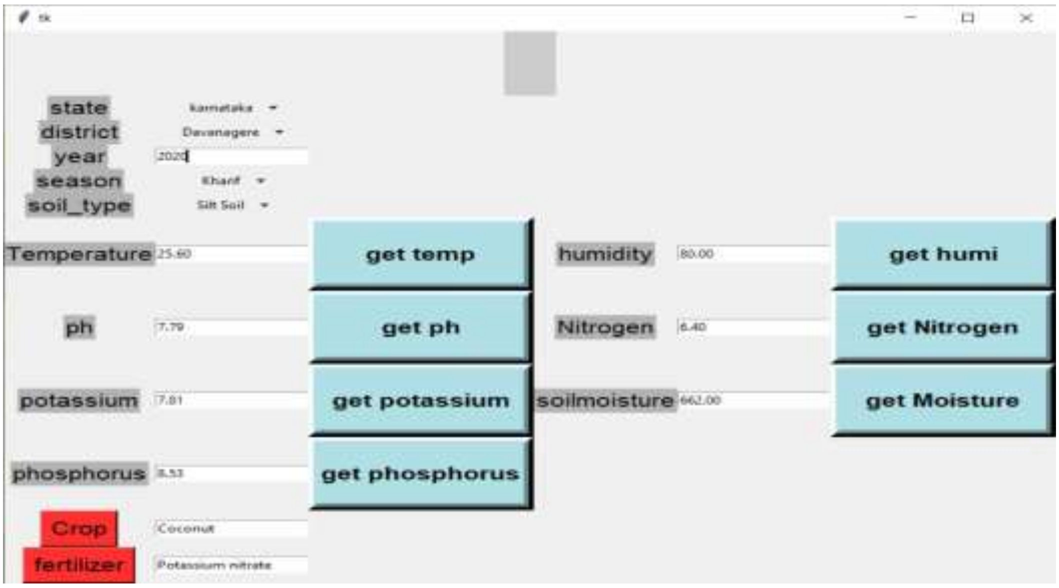

Fig: Result-3

Fig: Mobile Blynk application

Fig: Blynk computer application

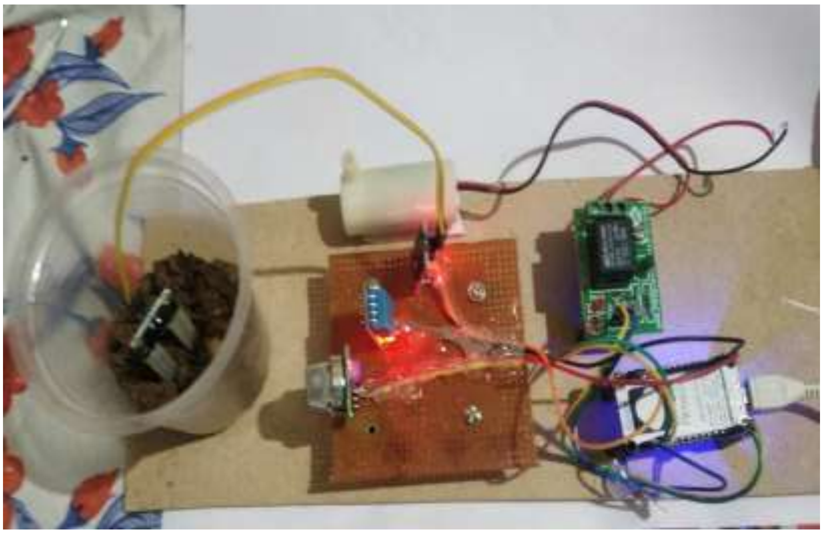

Fig: Hardware connection

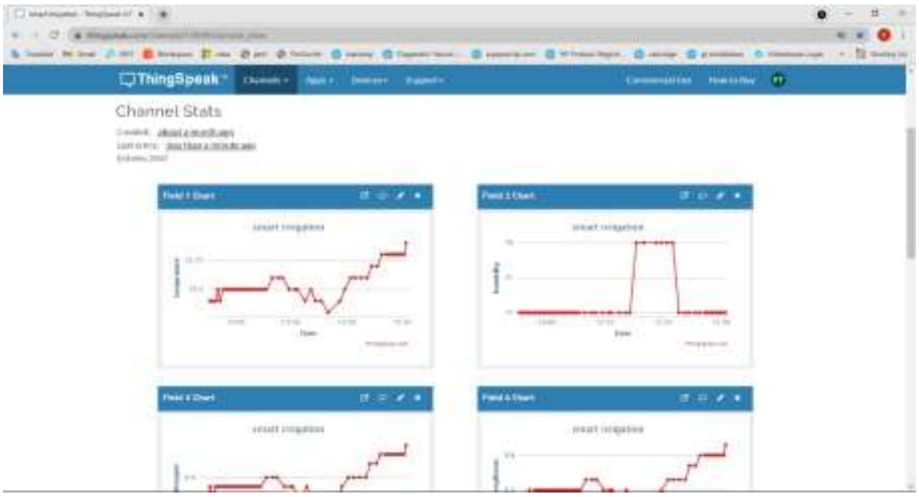

Fig: Thingspeak Management

6. CONCLUSION

This project will predicts crop harvest as well as appropriate produce by considering the data such as soil type, temperature, humidity, season, fertilizers. Quicker access to all the basic information regarding statistics used over which user can study the crop and also select the Prediction. User can select the crop production parameters to get the suitable crop for his farm. Provides simple conceptionfor user to understand and study things in easy way.This system allows the user to customize the parameters of crop while understanding results and prediction. System is provided with authentication and understand agriculturaltendencies in diverse area.

7. FUTURE ENHANCEMENTS

With the result of the project implementation in first step, In the future can transfer this project to large scale. System can be made more intelligent to predict user actions, soil fertility, time to harvest, etc. Using Machine Learning algorithms more advancements can be done in the future besides water consumption being managed in agriculture.To control system via Zig Bee instead of wire connection as well as developing a more reliable mobile application.Using renewable energy instead of batteries will help to reduce future cost.

8. REFERENCES

[1] "Agrajaher, janhavikasar, palashaahuja, varsha", "(2018)", "smart agriculture using clustering and iot", "international research journal of engineering and technology (IRJET)", "volume-5, page no: 4065-4068".
[2] "Nikesh Gondchawar , Prof. Dr. R. S. Kawitkar", "(2016)", "IoT based Smart Agriculture", "International Journal of Advanced Research in Computer and Communication Engineering (IJARCCE)", "Volume: 5, Page no: 838-842".
[3] "Zhao Liqiang, Yin Shouyi, Liu Leibo, Zhang Zhen, Wei Shaojun", "(2011)", "A Crop Monitoring System Based on Wireless Sensor Network", "Science Direct", "Elsevier", "Page no: 558-565".
[4] "Foughali Karim ,Fathalah Karim ,Ali frihid ", "(2017)", "Monitoring system using web of things in precision agriculture", "Science Direct", "Elsevier", "Page no: 402–409".
[5] "RaheelaShahzadi, JavedFerzund", "(2016)", "Internet of Things based Expert System for Smart Agriculture", "International Journal of Advanced Computer Science and Applications", "Research Gate", "Volume: 7, Page no: 341-350".
[6] "Ciprian-Radu RAD , Olimpiu HANCU , Ioana-Alexandra TAKACS , Gheorghe OLTEANU", "(2015)", "Smart Monitoring of Potato Crop: A Cyber-Physical System Architecture Model in the Field of Precision Agriculture", "Science Direct", "Elsevier", "Page no: 73-79".

