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IOT Based Recommendations for Crop Growth Management System

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Abstract*: It is mandatory to maintain good crop growth in every area like cotton, rice, jute, maize, etc., the proposed system consists of an IOT module that is used to monitor the state of each crop to grow in a good condition by providing requirements to it generally crop may not grow due to temperature rainfall moisture and pressure there are the primary requirements for which a crop to grow healthy to overcome this problem we are using sensors like water temperature, soil moisture, BME280 and wind velocity, all this sensors are connected to ESP32 and will detect the present value according to the climate and soil condition and transform the data from sensor to the cloud in which I have already stored the values all the detected values, which are transformed from controller to cloud and through web app all the detected values like climate, soil condition are displayed whether in normal condition or not and if the detected values proceed and exceed it alert and gives suggestion to farmer. Good condition cloud after receiving data compare with the default values all the detected values which are transformed from controller to cloud and through web app all the detected values will be displayed and climate ,soil condition are displayed weather in normal condition or not and if the detected values proceed and exceed it alert and gives suggestion to farmer.

Keywords: BME280, Soil Moisture Sensor, Water temperature Sensor, Wind Velocity Sensor ESP32, Cloud, web application

I. INTRODUCTION

The internet of things (IOT) is the network of physical devices, vehicles, home appliances and other items embedded with electronics, software, sensors actuators and connectivity which enable these objects to connect and exchange data it is the interconnection of uniquely identifiable embedded computing devices within the existing internet infrastructure.

II. SYSTEM ARCHITECTURE

To prevent crop growth problems here are the few techniques which are used in my project and esp32 is used as controller.

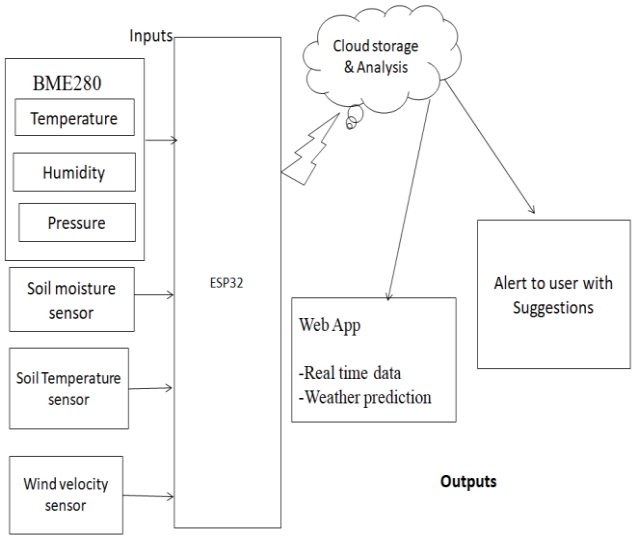

Fig1: Block Diagram Proposed Project

A. Software Description:

A. Arduino IDE: The Arduino IDE is an open source software were we can write, execute and upload to the board it can install in for windows, Linux, etc., here different languages like C, C++, embedded C. I have written the program in embedded C and uploaded to hardware board by connecting USB. The functions of IDE are setup() are used to execute or reset the program, loop() are used to repeat a specific block of code in the program.

B. Embedded C: It is a extension of C language but the main difference between both language is C is used only for desktop computers, while embedded C is used for microcontroller based application.

C. PHP: PHP stands for Hypertext Preprocessor, It is an open source, server-side, scripting language used for the development of Web Application.

D. Code Igniter: Code Igniter is an open-source software rapid development web framework, for use in building dynamic web sites with PHP. Code Igniter is based on the popular development pattern MVC(model–view-controller).

E. HTML: HTML stands for Hypertext Markup Language for creating web applications. With Cascading Style Sheets and Java Script. It is not a programming language. HTML works on a client computer (the system on which the page is being viewed).

F. Cloud Storage (Smart bridge): The smart bridge it is a real time storage service. This service provide application developers an API that allows application data to be synchronized across clients and stored on smart bridge also it is an web-app that helps quickly develop high-quality web apps.

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G. Web App: In my project web app is created then we should login to smart bridge cloud and can view input users as well as different crop details if required give the suggestions to farmers.

B. Hardware Description:

A. ESP32: It is an controller and has 38 pin, 32 bit processor inbuilt WI-FI and Bluetooth with two cores, CPU frequency of 160mhz, RAM of 512kb, flash of 16mb, GPIO pins of 36, 18ADC pins, 2DAC pins, 5 busses (SPI, I2C, UART, I2S, CAN). Few pins like 34th pin is connected to soil moister sensor, 33rd pin is connected to water temperature, 35th pin is to wind velocity, 21st and 22nd pins are to BME sensor. All this sensor values are stored and compared in cloud via esp32.

B. Soil Moisture Sensor: It is used to measure the moisture evaporation and plant uptake, to optimum crop irrigation. They are three pin two pins are connected to VCC and ground, 34th pin of esp32 is connected to output, to measure the soil condition and send the values to cloud and compare. [4]

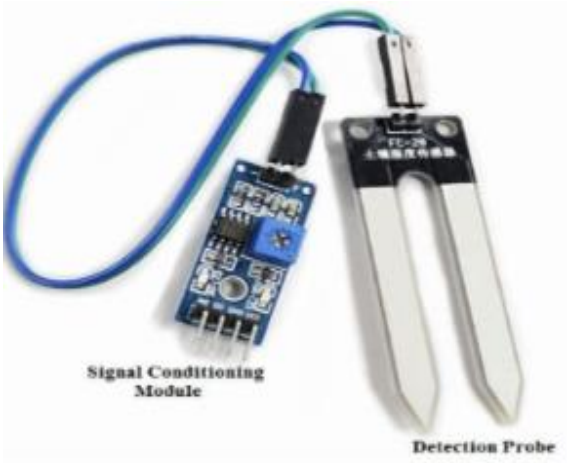

Fig2: Soil moisture sensor

C. Wind velocity Sensor: This sensor is used to predicate the weather condition and rain condition. They are three pins which two pins are connected to VCC and ground, and 35th pin of esp32 is connected to output, to measure the values and store in the cloud.

Fig3: Wind Velocity Sensor

D. BME280 Sensor: It has inbuilt of three sensors like temperature, Humidity, pressure and used to measure the condition of soil, They are four pins which two pins are connected to ground and VCC, SDA (data) pin to 21st pin of esp32, SCL (clock) pin connected to 22nd pin of esp32 [3]4

Fig4: BME280 sensor

E. Water Temperature sensor: It is to measure the water level in soil, They are three pins two pins are connected to VCC and ground and 3rd pin to 33rd pin of esp32.

Fig5 : Water temperature sensor

III. SYSTEM IMPLEMENTATION

The proposed system consists of an IOT module that is used to monitor the state of each crop to grow in a good condition by providing requirements to it generally crop may not grow due to temperature rainfall moisture and pressure there are the primary requirements for which a crop to grow healthy to overcome this problem we are using sensors like water temperature, soil moisture, BME280 and wind velocity, all this sensors are connected to ESP32 and will detect the present value according to the climate and soil condition and transform the data from sensor to the cloud in which I have already stored the default values for good condition cloud after receiving the data it compare with the default values all the detected values, through web app all the detected values like climate, soil condition are displayed whether in normal condition or not and if the detected values proceed and exceed it alert and gives suggestion to farmer. so in order to help farmers we design a system which will help farmers by giving necessary recommendations based on real time predicted weather parameters and soil condition data collected from the sensors.

IV. RESULTS

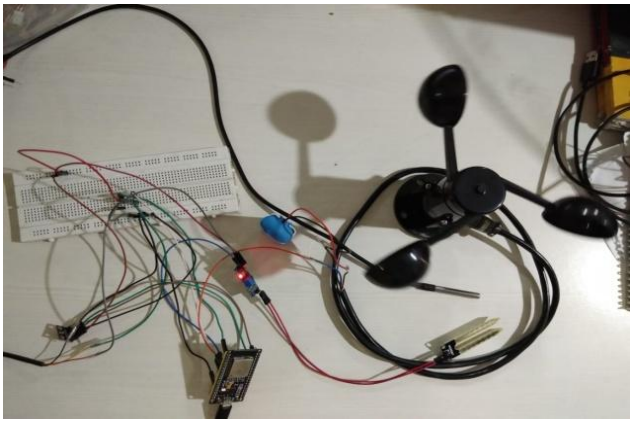

Fig 6: Hardware setup of crop growth and wind velocity, temperature, rainfall all the sensor input parameter are upload to cloud via esp32 controller to measure and compare the present and already stored data .After comparison the results are displayed in the form of graph and can suggest to farmer throught web application.[6]

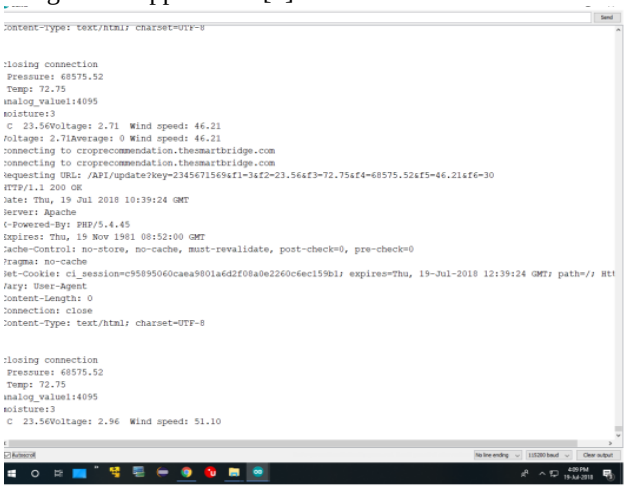

Fig7: sensor output results in the form of values in serial monitoring. This values will upload to cloud.

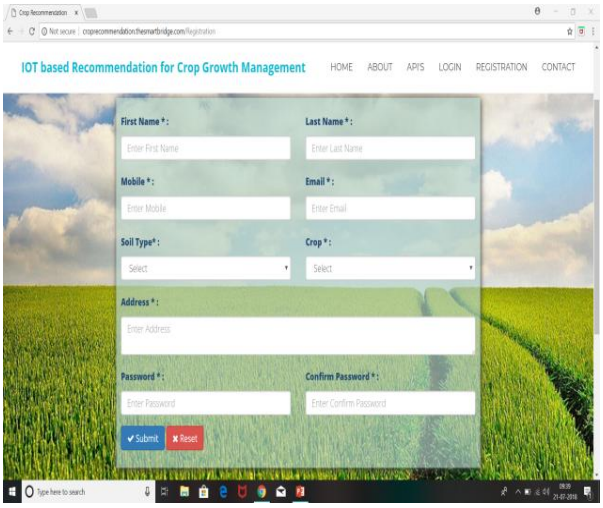

Fig8: Web application registration page where user and authorities can register and login.

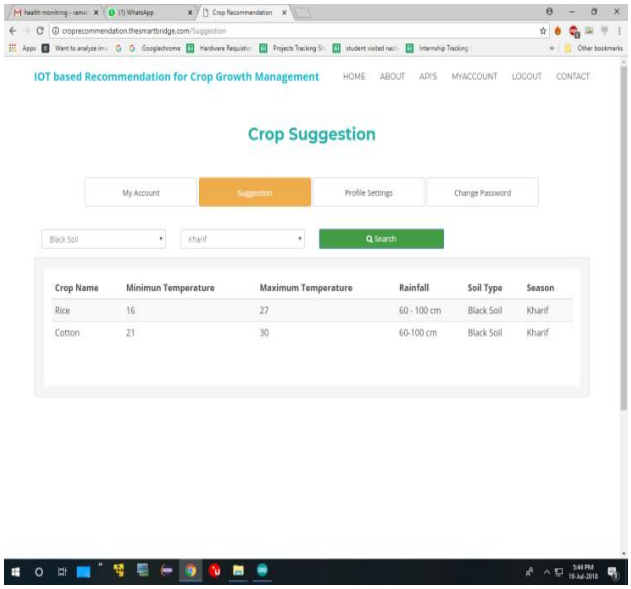

Table:1 Web app where the uploaded information are stored like rice and cotton, here authority can send a alert to former after comparing the present and already store data.

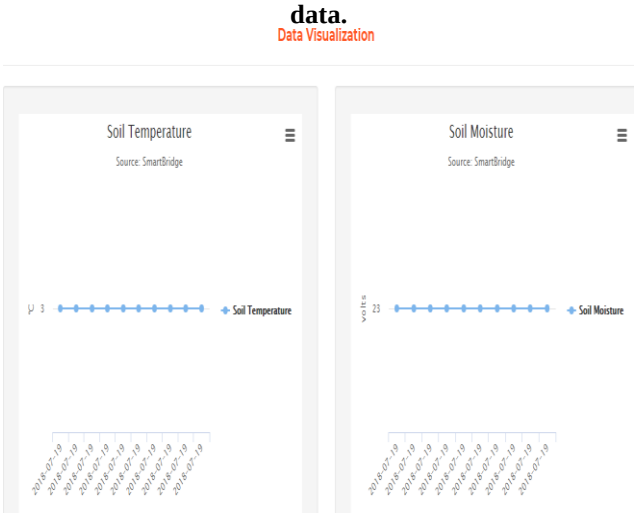

Fig9: Graphical representation of cotton and rice in web application.

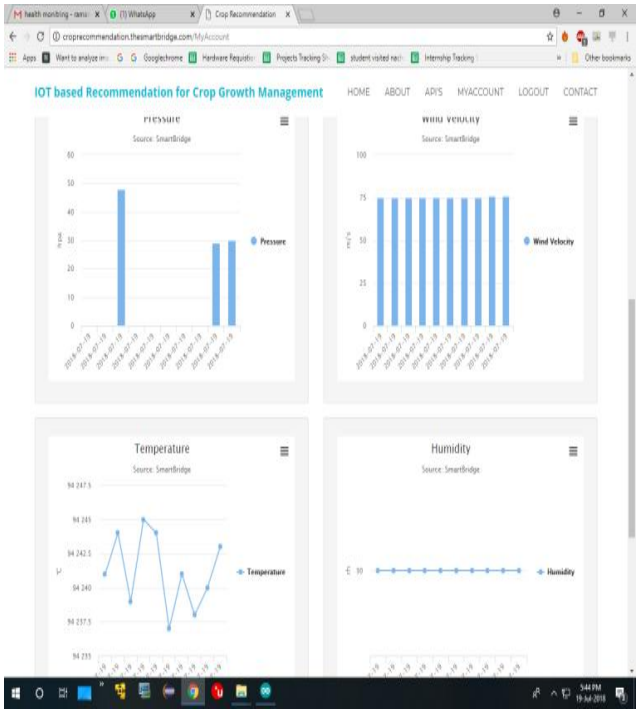

Fig10: Graphical representation of rice and cotton in web application.

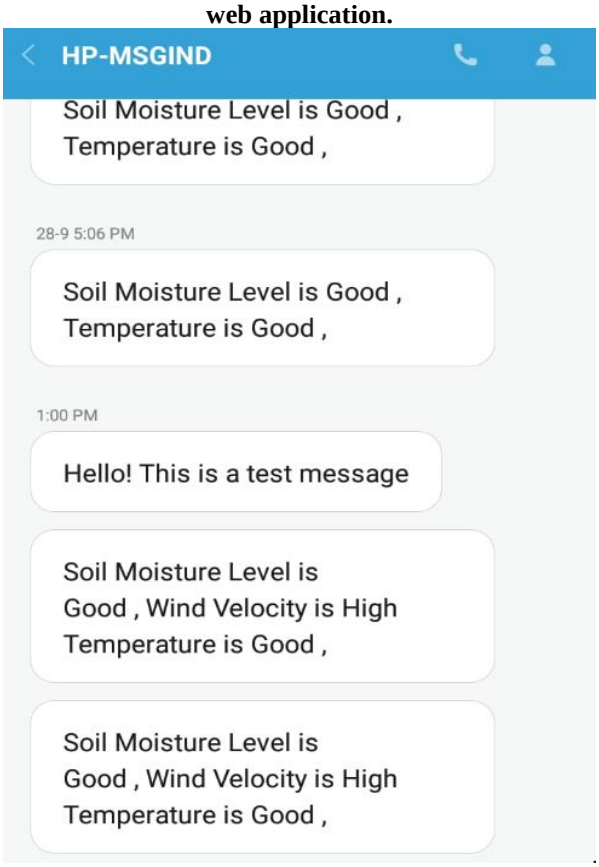

Fig:7 Alerting the farmer through message.

V.CONCULATION

The proposed system consists of an IOT module that is used to monitor the state of each crop to grow in a good condition by providing requirements to it generally crop may not grow due to temperature rainfall moisture and pressure there are the primary requirements for which a crop to grow healthy to overcome this problem we are using sensors like water temperature, soil moisture, BME280 and wind velocity, all this sensors are connected to ESP32 and will detect the present value according to the climate and soil condition and transform the data from sensor to the cloud in which I have already stored the values all the detected values, through web app all the detected values like climate, soil condition are displayed whether in normal condition or not and if the detected values proceed and exceed it alert and gives suggestion to farmer.

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REFERENCES

1. Romeo Mawonike And Vinscent Nkomo. “Univariate Statistical Process Control Of Super Saver Beans: A Case Of Rmv Supermarket, Zimbabwe”. Journal Of Management And Science , Vol.5,PP.No 48-58, 2015.
2. Haider Raza N, Girijeshprasad,Yuhuali . “Ewma Model Based Shift-Detection Methods For Detecting Covariate Shifts In Non-Stationary Environments”.Patternrecognition, Science Direct ,Vol.48, PP.No659–669,
3. Liu Yumei, Zhang Changli , Zhu Ping. “The Temperature Humidity Monitoring System Of Soil Based On Wireless Sensor Networks” Electric Information and control engineering (ICEICE), PP. No 1-4, 2011.
4. Jeonghwan Hwang, Changsun Shin And Hyun Yoe . “Study On An Agricultural Environment Monitoring Server System Using Wireless Sensor Network”, IEEE Sensors 2010 Vol.10, PP.No11189-11211, 2010
5. L. Carlone, J. Dong, S. Fenu, G. Rains, and F. Dellaert, “Towards 4D crop analysis in precision agriculture: Estimating plant height and crown radius over time via expectation-maximization,” in ICRA Workshop on Robotics in Agriculture, 2015.
6. Chirima Justin, Chinofunga Peter Tinashe, Zvobgo Rungano Jonas ,Mufandaedza,Jonathan And Dambaza Marx. “Application Of Statistical Control Charts To Climate Change Detection In Masvingo City, Zimbabwe”. Journal
7. Dae-Heon Park,Beom-Jin Kang,Kyung-Ryong Cho ,Chang-Sun Shin ,Sung-Eon Cho,Jang-Woo Park ,Won-Mo Yang. “A Study On Greenhouse Automatic Control System Based Onwireless Sensor Network”, Wireless Personal Communication Springer journal , Vol 56, PP.No 117–130, 2011.
8. www.Agriinf
9. Y. Li, X. Fan, N. J. Mitra, D. Chamovitz, D. Cohen-Or, and B. Chen, “Analyzing growing plants from 4D point cloud data,” ACM Transactions on Graphics (TOG) - Proceedings of ACM SIGGRAPH Asia, vol. 32, no. 6, p. 157, 2013.
10. C. Wu, B. Clipp, X. Li, J.-M. Frahm, and M. Pollefeys, “3d model matching with viewpoint-invariant patches (VIP),” in IEEE Conf. on Computer Vision and Pattern Recognition (CVPR), pp. 1–8, 2008.