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REAL TIME PLANT HEALTH MONITORING SYSTEM USING SENSORS AND CLOUDS

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Abstract-Agriculture drives the economy of India. Monitoring plant growth at real time helps us to provide proper treatment to plant and increase the yield of our crop. The farmers need to sign up with the details of the type of crops they are growing and the location of their field. The GPS service will identify the field. Device will collect real time data for pH levels, humidity, temperature, water salinity, and the soil conditions using different sensors. The real time data will be compared with standard data available for the crop and will provide farmer with an overview of what is lacking for its plant growth. Front End will be a webpage designed for output, which will contain form for sign up and sign in for the farmers. Data will be stored in Amazon Cloud and the website to be hosted by Amazon web services which provides easy and faster access to websites.

Keywords–Agriculture, Smart Farming, Wireless Sensor Network, Website, AWS Cloud

I. INTRODUCTION

This paper presents a system that monitors real time plant health using sensor network, embedded system and Clouds. People are taking advantages of the recent development in the embedded system into monitoring and controlling their crops health. Creating a system which is easily accessible to monitor their plant health by providing data for their field conditions, humidity, pH level, water salinity and provide use full data about their plant. Our system provides farmers to easily choose which crop is suitable for crop at that natural condition of the field. In the proposed system which is constructed in a technical way that uses very low cost power supply which can be easily generated at the spot and for monitoring the plants health the farmer needs to log in and sign up in our proposed system website.

Our system website will help the farmer to keep in check with the water quantity or the irrigation system required by the plant at that certain real time climatic conditions in the field.

The farmer can easily control the motor implanted on its field using a simple messenger which will receive the input signal from the sensors and will output the decision to the arduino processor. .

The major problems in Indian agriculture nowadays are small holdings, depleted soil and lack of some easily driven systems to improve the yield at a large scale. Keeping in check the soil salinities at the real time can help us reduce the crops vulnerability to depleted soil conditions.

D.D Chaudhary et al[1] reports that the technological development in the Wireless sensor networks made it possible to use in monitoring certain crops parameter and control of greenhouse parameters in precision agriculture. This paper[1] has analysed and proposed the use of programmable system on chip technology(PSoC) as a part of wireless sensor networks to monitor various parameter of greenhouse.

Yunseop (James) kim et al[2] reports that water management is a major concern in cropping system in semiarid and arid areas. Distributed sensors on the field helps us to keep in check the water quantity required for the crops and helps in maximizing the productivity by reducing human lever and time. The programming logic controller in our system will get updated with the GPS location of the part of the field which is lacking water content. This will help us to control the sprinkles on only that part of the land and thus saving a precise amount of water from being getting wasted.

Andrew J. Skinner et al[3] has investigated the recent development of wetting-front detectors has provided a low energy method of collecting transient samples of soil water under irrigation and rainfall conditions. The detectors works on the principle of flow line convergence. The Full Stop wetting-front detector helps us to see what is happening down in the root zone when you irrigate the soil. The detector also collects water sample from each wetting-front to keep in track fertilizer and salt movement.

Smart Farming is a farming management concept using modern technology to increase the quantity and quality of agricultural products. Farmers in the 21st century have access to GPS, soil scanning, data management, and Internet of Things technologies. By precisely measuring variations within a field and adapting the strategy accordingly, farmers can greatly increase the effectiveness of pesticides and fertilizers, and use them more selectively. Similarly, using Smart Farming techniques, farmers can better monitor the needs of individual animals and adjust their nutrition correspondingly, thereby preventing disease and enhancing herd health.

II. ONLINE FARMING

Smart Farming represents the application of modern Information and Communication Technologies (ICT) into agriculture, leading to what can be called a Third Green Revolution. Following the plant breeding and genetics revolutions, this Third Green Revolution is taking over the agricultural world based upon the combined application of ICT solutions such as precision equipment, the Internet of Things (IoT), sensors and actuators, geo-positioning systems, Big Data, Unmanned Aerial Vehicles (UAVs, drones), robotics, etc. Smart Farming has a real potential to deliver a more productive and sustainable agricultural production, based on a more precise and resource-efficient approach. However, while in the USA possibly up to 80% of farmers use some kind of SFT, in Europe it is no more than 24%.

Smart Farming applications do not target only large, conventional farming exploitations, but could also be new levers to boost other common or growing trends in agricultural exploitations, such as family farming (small or complex spaces, specific cultures and/or cattle, preservation of high quality or particular varieties,…), organic farming, and enhance a very respected and transparent farming according to European consumer, society and market consciousness. Smart Farming can also provide great benefits in terms of environmental issues, for example, through more efficient use of water, or optimisation of treatments and inputs. The application of IoT based smart farming not only target conventional large farming operation, but could also be new levers to uplift other growing or common trends in agriculture like organic farming, family farming, and enhanced highly transparent farming.

III.FRONT END

In this system the front end will consist of webpage that will allow the farmers to sign up and log in with the device address.

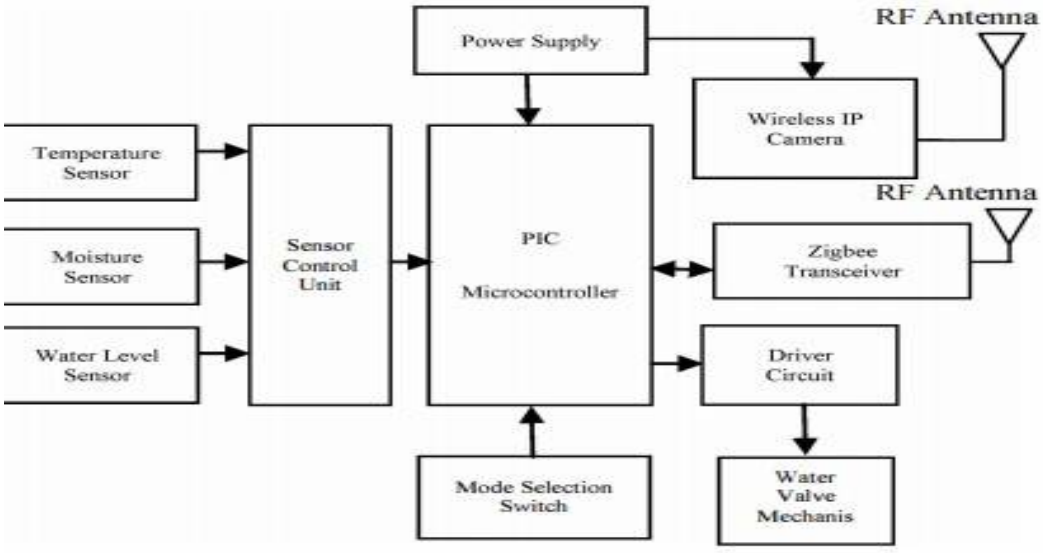

Fig 1 Block diagram of front end

It will contain all the output data that the farmer wishes to see. Various sensors will be used to access the on field real-time data. Forms will contain details for sign up with their location and the GPS will do its work on tracing the location of the field. During sign up the farmers needs to enter the crops name for monitoring it. This will help us to access the database of various standard values, optimum for that crops hygienic growth stored in our proposed system. Through this we can present an overview of requirements that a crop require under certain climatic conditions.

IV.MANAGEMENT MODULE

Our proposed system will ease out the input work done by the farmers. Our controller will control different processes on the basis of the code uploaded in it. It is responsible for collecting all the data from the front end, like soil salinity value, humidity, temperature, water level sensor. The data's will be received by the zigbee transceiver which will be further processed in our processor to generate an overview required by the farmer. The database stored in our system will help the farmers to judge the type of crop that should be grown on a piece of land under some climatic conditions. Our intelligent processor will compare all the data's received at the transceiver and will generate a output with the most favourable crop that can be grown there.

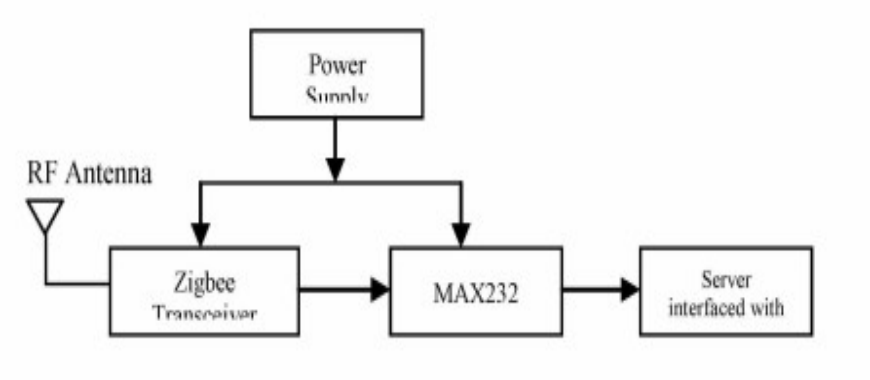

Fig.2 Block diagram of management module.

V. CONTROL MODULE

Through this project we can monitor control and enhance the system using internet. This module discusses the front end that is the software part through which the farming website is created. The farming website consists of the following webpages through which the farmer can control his farm.

A) Homepage and its parameters

- Create new account.
- Log in with username and password
- Retrieve password

B) User page and its parameters

- Farm status.
- Climate status of farm
- Penetration level of the water.
- Water Salinity of the soil.
- Recommendations for various crops health at different conditions.
- Controlling irrigation system.
- Easy management ideas
- Disease detection

C) User management

- Account management
- Feedback
- Get Help
- Contacts

VI. RESULTS

The model will generate an outcome which will provide the farmers with a base platform to figure out decision to be processed in the field. The motor can be operated easily judging the water content of the soil by the data collected by the sensors on the field. Plants disease identification can also be done on the basis of data available. Best irrigation method suitable for the crops during a certain climatic condition can also be obtained easily through our model.

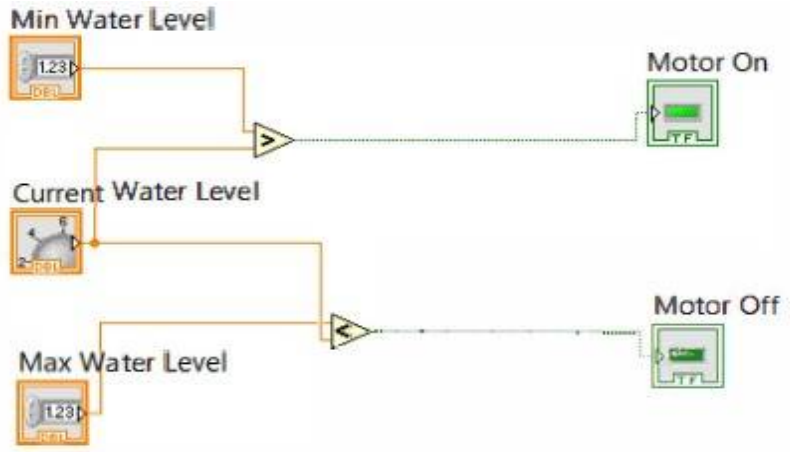

Fig.3 Indicating on and off condition of the motor.

VII.FUTURE SCOPE

Monitoring plant health at regular interval of time can improve the productivity at a large scale. The idea following is that the farmer needs to store their previous data for different parameters and our algorithm will compare the data each time being entered or stored with the previous data stored in order to produce an overview of the plant health at real time. The spot cameras can be used to monitor the plant each time when an input signal is given to the processor. Through image processing, comparing the image collected with the images stored in our database. The database will contain various images of infected plant captured during a certain period of time in order to produce an output with very low possibility of error. The amazon cloud service being used will ensure that the data stored by the farmers are secured and ensuring no data loss. The CloudFront technology will ensure that the distribution of data of the infected plant will get distributed at each server end according to the request from the frontend by the farmers. This will ensure that the real time data gets compared to only limited images so as to produce the output at a faster rate. Hence enhancing the system capability in future.

VIII.CONCLUSION

Monitoring plant health at a regular interval of time will help the farmers to increase the productivity at a large scale with minimum efforts. The cloud technology used will create a favourable environment for the farmers regarding the health of the plant.

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