Invigilator System using Internet of Things in Precision Cultivation

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***Abstract*— As water supplies turn out to be rare as a result of climatically change, there is an urgent need to irrigate more effectively so as to improve water utilize. In this specific circumstance, agriculturists' utilization of decision support system unavoidable. In fact, the constant supervision of microclimatic conditions are the best way to know the water needs of a culture. Remote sensor systems are assuming a vital part with the coming of the Internet of things and the speculation of the utilization of web in the group of the agriculturists. It will be sensible to make supervision conceivable through web administrations. The IOT cloud speaks to stages that permit to make web administrations reasonable for the items incorporated on the Internet. In this paper we propose an application model for exactness cultivating utilizing a remote sensor coordinate with an IOT cloud.**

I. INTRODUCTION

A wireless sensor network is a network made out of an arrangement of nodes incorporating the elements of acquiring, processing, and communicating. Once deployed, the nodes coordinate with each other self-sufficiently to gather and transmit information to a base station so as to screen and/or control a phenomenon. These days, the utilization of WSN knows an awesome blast in areas as diverse as the military, medicine, nature and exactness horticulture.

Accuracy farming can be characterized as the workmanship and investigation of utilizing innovation to enhance edit creation. This is accomplished by giving data correlated to farming legitimately identified with metrological variables (temperature, stickiness, daylight, wind. In this unique circumstance, executing keen water system strategies that enhance the productivity of water utilize will help ranchers to make their exercises more gainful while in the meantime improving the supportability of horticulture in its together. Test comes about have demonstrated that the unwavering quality and the expansion of yield growth[1],[2],[3].Nowadays a few IOT cloud stages have been put on the web. These most recent UI offers cordial uses to any individual who needs to screen at a lower cost associated objects. Regardless of their utilization in car and shrewd city applications, the combination of these in accuracy horticulture applications is not exceptionally far reaching. In this venture we are occupied with setting up and testing a framework in light of the system of remote sensors and the Internet of items and IOT cloud stages with regards to exactness horticulture. In this paper we propose to depict a model framework in light of a system of sensors and an IOT cloud that cautions the rancher when the products should be inundated.

II. RELATED WORK:

IoT framework and platforms are as yet new for horticulture, but there is a pattern now to apply IOT in the farming division. In [12] Duan Yan-e et al proposed an IOT application that provides agricultural information and crop information to farmers on the basis of collected wireless sensor network data. This information is used to ensure that the rate of Fertilizer application and within the recommended limit. In [13] Xiangyu HU et al. Developed an IOT application for remote monitoring and control of agricultural fields, which is based on the analysis of data collected by the wireless sensor network, which has enabled farmers to minimize the cost of hand And the efficient use of water resources. In [14] Andreas Kamilaris et al. Have proposed an application called Agri-IOT allowing the analysis and the processing of data coming from a network of sensors (WSN) while exploiting the semantic aspects. This will make it possible to associate an easy publication of data on the semantic web.

III. BACKGROUND

A. Precision agriculture

precision agriculture is a guideline of administration of rural bundles showed up in the United States in the 1980s. As of now in 1985, analysts from the University of Minnesota shift the admission of calcium changes on farming plots. We at that point attempt to regulate the addition of specific sources of info (nitrogen, phosphorus, potassium) in certain high-vitality serious harvests and information sources (maize, sugar beet for instance), with regards to race to advance farming yields.

Essentially exactness cultivating goes for streamlining yields and speculations [4],[5],[6] trying to better record for the inconstancy of situations and enhancing conditions between various plots. It has impacted culturing, seeding, treatment, water system and pesticide splashing. By and

by The point is to upgrade the administration of a plot from a triple perspective:

- Agronomic: The agronomic exactness goes for enhancing the proficiency of information sources/yields, including the selection of strains and assortments more adjusted to the edaphic or phytosanitary setting
- Environmental: It likewise includes decreasing certain dangers to human wellbeing and the earth (specifically by lessening the natural arrival of nitrates, phosphates and pesticides). Economic: Increase yields, while reducing energy consumption and chemical inputs.
- Economic: Increase yields, while lessening vitality utilization and concoction inputs.

B. WSN

Systems of independent wireless sensors is promising innovation which is making its place to supplement these current arrangements and remunerate their inadequacies: Implemented in plots, they can persistently screen distinctive parameters. "This is another era of implanted frameworks combined with remote correspondence advancements. Because of these gadgets, it is conceivable to obtain, store, handle and transmit information. Fig. 1.

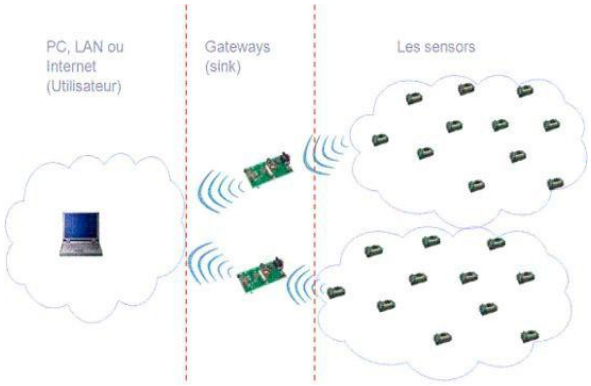

Fig. 1 WSN architecture.

C. IOT Cloud

IoT is a situation in which objects, creatures and individuals are assigned as unique identifiers, IOT makes it conceivable as the capacity to exchange information over a system without requiring any human connection To-human or human-to-machine. The design of the Internet of the articles Fig2 depends fundamentally on 4 forms permitting to gather, to store, to transmit and to treat information from the physical world. The part of the distinctive procedures displayed in Fig 2 is portrayed as takes after:

- gather information: alludes to the activity of changing a simple physical greatness into an advanced flag.

- Interconnect: enables you to interface a particular object network with a standard IP network (e.g. WiFi) or shopper gadgets.

- Store: qualifies the aggregation of raw data, produced in real time, meta tagged, arriving in an unpredictable way. Finally, exhibiting shows the capacity to reestablish data in a way that is justifiable to people, while offering a methods for acting and/or collaborating.

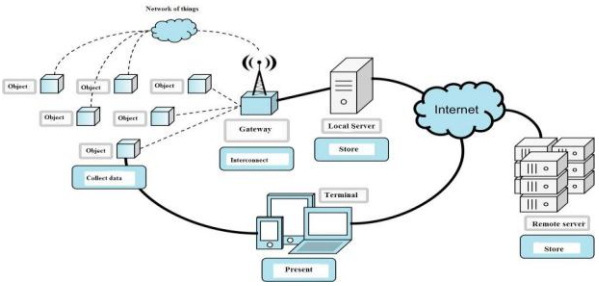

Fig.2. IOT Architecture

D. Architecture system design

The general architecture Fig 3 of our supervisory system can be described in a three-third application. A third party connected to the sensor network deployed in the plots, a third party connected to the gateway intended to transmit the data via the Internet, and a third based on the web application of objects via the platform ubidots

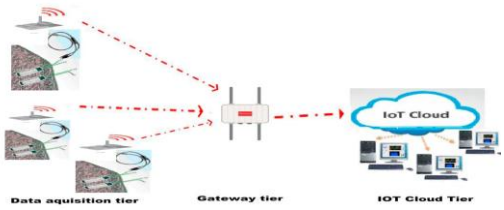

Fig. 3. Architecture system design

1. Tier of sensor Network

In this part we will use sensor nodes of type waspmote 01. These are manufactured by the Libelium company based on the Arduino hardware open source technology. Each sensor node is equipped primarily with an Atmega 128 microcontroller. An IEEE 802.15.4 ZigBee Transceiver, an energy management module and a flash memory management system on an SDRAM card. The various modules of the card are connected by buses of type uart, spi and i2c. Each wasmpote node is equipped with a soil moisture sensor. The latter is equipped with two electrodes incorporated in a gain above gypsum slice. It is buried in the ground to measure the soil water pressure which reflects the moisture state of the soil. The higher the voltage, the more dry the ground.

2. Tier Gateway

The tier gateway allows the connection between the sensor network and the Internet network. Indeed the communications between the sensor nodes are made using the 802.15.4 protocol, the frame format of which is not directly integrable in the Internet network. This tier mainly comprises a hardware part and a software part. The hardware part corresponds to a gateway between the 802.15.4 network and the GPRS network. On the market

alone the company libelium offers a gateway of this type named meshlium, this term is a derivative of the word mesh (network mesh or ad_doc) and the word "libeluim". In the remainder of this paragraph we shall describe in detail the use of Meshlium.

Meshlium is a multi-protocol router that contains 5 wireless connection interfaces: 2.4GHz Wifi, 5GHz Wifi, Blutooth, ZigBee and 3G / GPRS. This latest GPRS module is very friendly-uses for mobile applications. In addition the Meshlium is to be deployed in any environment since it made of and is also waterproofing in case it is

to be placed in agricultural fields outdoors. Meshlium, multi-protocol router of Libelium , collects all data from sensor nodes and stores them in a local database or exported to an external database.

3. Tier IOT Cloud

This tier corresponds to the interface part of the user indeed with the development of the internet objects the need to have platforms that simplifies the task of supervising these objects is important. From the beginning of the 2010s the platforms called IOT cloud multiplied[7]p[8]. Their main objective is to offer plug and play to all sensor nodes however to the limit of our knowledge these applications have not been tested in precision irrigation applications. In this tier one will use ubidots in order to supervise note network sensor wasmpote in the continuation of this paragraph to describe the functionalities offered by ubidots

Ubidots offers a platform for developers that allows them to easily capture sensor data and turn it into useful information. Ubidots is used to send data to the cloud from any Internet device. In addition to this service, you can define triggers and alerts that, can automate responses to the data thresholds you have defined

IV. DEPLOYMENT

A. Field description

The chosen terrain for deployment is located in the Ras Jbel area. According to the soil classification map for irrigation[9], the top quality arable land is located in the median zone of the perimeter near the town of Ras Jebel. Occupied by vegetable crops and irrigated arboriculture. Non-arable land is located on the coastal dunes of the Mediterranean, covering 20.5% of the total area of the perimeter. These soils are reserved for dry crops.

B. Node programming and configuration

The application that we implemented had to meet two imperatives, Recover data from sensors and transfer them to Meshlium and Publish these data collected on the net via a cloud platform. In order to achieve this two imperatives we start to flash each transmitter motes with a program written in C language.

C. GATEWAY PROGRAMMING AND CONFIGURATION

Mainly is based on a process that allows to recover the frames received on the IEE 802.15.4 module and to fragment the data then to integrate it in a Json code compatible to the format of ubidots and to transmit it via internet by the module GPRS.

D. Monitoring interface

The user interface is mainly composed of three parts: The first part is an overview based on Google maps of our farm field to supervise. It is a field composed of four plots that are managing differently. The blue dots on the map shows the actual position of the sensor nodes.

The second part represents the different soil moisture levels associated with each plot.

The third part shows the historical evolution of soil moisture on the four plots. This user-friendly interface provide a farmer with the minimum knowledge of Information and Communication Technology to understand the state of drought or saturation of Its soil in each plot. For each parcel a trigger is defined an alert will be transmitting to agriculture an SMS when the value of soil water voltage is greater than or equal to 100 cba (centibar), indicating the parcel in question in order to avoid water stress. By referring to Table 1 which represents the guide[10] for the interpretation of the values of soil moisture.

Table 1. Guide for interpreting the soil moisture

Soil water tension	indication
0-10	Soil is saturated with water
10-30	Soil is adequately wet
30-60	Usual range for irrigation in heavy clay wet
100-200	Soil becoming dangerously dry for maximum production

V. CONCLUSION

This work present the ready framework for the control of water stress of plants utilizing IOT technology.The initial segment depicted the means of the creation the decision support system proposed to a horticultural group with a specific end goal to have the capacity to appraise the amounts of water required.

For water system administration, the farmaer will on the benifited from a dashboard programming in tyhe form of a graph . To track in real time the varieties of the soil conditions and then again a procedure of warning by sms will be transmitted Via the application when a basic level is come to stay away from water stretch. This application can be enhanced is to make it exceptionally advanced one conceives the incorporation of the strategy for evapotranspiration to figure the water prerequisite of a plant for each day in our arrangement of choice help.

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