



How Cloud Computing Helps in Precision Agriculture

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HOW CLOUD COMPUTING HELPS IN PRECISION AGRICULTURE

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Abstract – Cloud computing technology is growing broadly day by day, using of cloud computing in precision agriculture is more helpful in development of India. In this modern era everything is getting centralized, it is the finest chance to utilize the data report of precision agriculture in centralized manner. Farmer have to do lots of toiling regarding Agriculture problems, and if they manage to collect the soil related data ultimately, they don't know what to do and how to do. This problem solved by Cloud Computing and IoT, with the help of Cloud Computing the farmer can send the soil related data which is related to the precision agriculture to the expert agriculture department. Different types of sensors like Moisture sensor, PIR sensor, Gas sensor, Humidity sensor, Fire sensor, UV sensor and Ph sensor makes the system more advanced and effective. We are using Node MCU ESP8266 to make cost efficient and power efficient model. Generally, Node MCU consumes less power than Arduino and Raspberry pi and equally it cost lesser than Arduino and Raspberry pi. The whole Framework is designed in such manner that the connection between the hardware as well as software works more efficiently and fluently and also this centralized framework is cost efficient. The combination of Cloud and IoT provide security also to the data and information. The big issue of security is also covered by this system.

Keywords- Cloud computing, IoT, IaaS, PaaS, SaaS, Irrigation, Sensors.

1. INTRODUCTION

Now a days Agriculture has become a major topic in India, this is due to the dependency of Agriculture, in India agriculture plays a vital role of development and production. Not only the system but whole nation is depended on Agriculture. The technology is growing faster day by day, but somewhere and somehow this seriously effecting the agriculture. The major and vital reason of effecting agriculture is the lack of wisdom in farmer, farmer usually unable to take care the crops and plants and the assumption is not only possible for healthy and successfully production of plant. Many times, they fail in irrigation this laid loss of water or not supplying require amount of water in expected time. The biggest problem by which farmers are suffering that is unexpected rainfall or not fixed rainfall, this problem act as a barrier for farmers. Ultimately to solve this problem we have to store rain water and provide water to the crop or plant as per their need, accurate water supply process without loss and lack. Now the next problem is lack of wisdom in farmers, they don't know the appropriate data condition (heat, moisture, water, Ph, salinity, etc.) for crops and plants not only these but they have to also protect their plant from various insects and fire. Our main agenda is to give an easy, cost efficient, less toiling, and maintainable technique by which we can reduce their loss and they will be able to survive easily in farming and cultivation as well as with better production. This problem was solved by using various types of sensor and a new advanced technology mixture of both cloud computing and IoT. By the help of these sensors we can read the data and it will send to the cloud with the help of that the farmers can easily know what precaution should be taken and what are the next work for future. This whole framework is designed in such manner that it will help the farmer to overcome from any situations related to the crops. Now in this modern era of technology security is the main issue, that will be also maintained by the cloud providing high data security. [1] This paper introduced the easiest way of irrigation using Node MCU a smartest remote-control system which can be also managed by smart phones. [2] We can also use Arduino with Node MCU for more better and advanced result. [3] Fire sensor and Gas sensor played major part for the crops, harmful gas or smoke can be detect by these sensors. [4] We are using cloud computing,

basically it is a mixture of Hardware and Software, and as a whole the complete irrigation system or the managing of agriculture resource is nothing but a combination of hardware and software system. [5] For monitoring purposes of device we will use Internet of Things (IoT). [6] In this paper we will learn about different types of sensors and their work according to the environmental condition which is necessary for their need related to the condition of crops. The cost-efficient model and also easy to use which can give better production and output without excess loss.

2. LITERATURE REVIEW

- a) The main agenda of this paper is to help the farmer in reducing work load and unnecessary loss.
- b) In this paper we will determine that it also gives security to crop related data, and makes the system more efficient.
- c) This paper also helps to determine about pre assumption condition, precaution should be taken, cure of excess loss, all problem which is related to crops.
- d) In this paper we will study that how cloud computing and IoT helps in irrigation to make more better performance in Agriculture field than previous.
- e) This paper also determines the use of sensors and also sensor monitoring, their work, their use.

3. METHODOLOGY

In this precision agriculture we are using different types of sensors i.e. PIR sensor, Moisture sensor, Temperature sensor, Humidity sensor, Gas sensor, Fire sensor, pump motor, buzzer. Gas sensor will help to sense the toxic and harmful gases, if it will sense some these types of gases then the information will be sent to the cloud and beside fire sensor will also work in same manner if some type of smoke is detected it will send the information to the cloud.

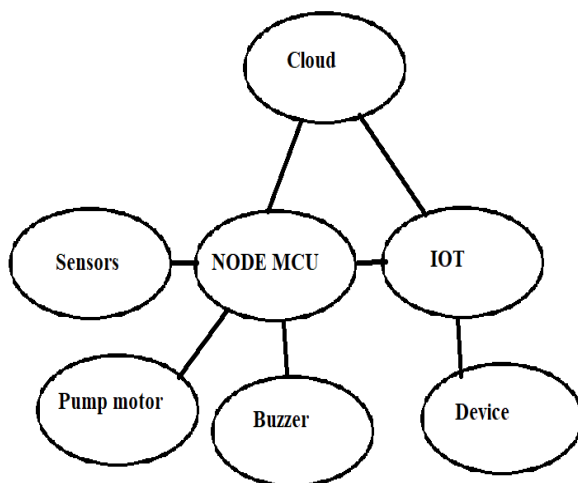


Fig. 1. Systematic structure

3.1 NODE MCU

For making the cost efficient model we are using Node MCU ESP8266 rather than Arduino and Raspberry pi besides Node MCU have its own advantage of Wi-Fi connectivity and gateway of data, when it comes to cost efficient that means somehow it is also related to power while Node MCU is also power efficient as well, it consumes less power than Arduino and Raspberry pi. Though if we want to make more advance efficient technique then we can also connect Arduino (to collect analog signal) with Node MCU for more better performance in productivity. For Node MCU we use Lua script. We can also program Node MCU by using Arduino IDE.

3.2 GAS SENSOR

Gas sensor also plays an important role in Agriculture, if some toxic gas is detected or kind of oxygen deficient occurred then it will give alert by a sound or an alarm.

3.3 PIR SENSOR

The Passive Infrared Sensor (PIR) sensor is used for measuring Infrared light which emits from the object (human, animals etc.). It works as an alarm type system. But PIR sensor doesn't give detailed information about the object, for better and complete information we use active IR sensor along. If some object is detected then it will send information to the farmer or alert the farmer for consequence.

3.4 MOISTURE LEVEL SENSOR

Soil moisture sense the moisture of the soil, how much water does soil need or how much the soil is damp, according to the condition of crops it provide water. Only it provides as much as water it needed not more than that or not less than it needs though this is an automated watering system.

3.5 HUMIDITY SENSOR

For the better growth of crop or plant an appropriate environment condition is required, mostly for humidity most of the plant doesn't grow properly and also doesn't give required amount of output so it is very important to sense the humidity, humidity means how much amount of water present in air by the help of this information we can maintain our crops for better production and thus we can also save water loss.

3.6 FIRE SENSOR

The most important issue is fire, many times fire cause huge damage to crops and it only effect in production. So, to overcome this situation we introduce the fire sensor or flame sensor, the fire sensor sense the smoke and heat related information and it will send to the microcontroller then the buzzer will be tuned on and finally the farmer receives an alert message.

3.7 PH SENSOR

In India there is different types of soil quality is present, some soil is more acidic and basic and some are less same. This sense the soil acidic and basic level and determine which type of crops are suitable for the soil how we can maintain the crop for better output.

3.8 UV SENSOR

Sunlight is the main source of production of crops while the development of the crops depends on light intensity. It measured the UV index. Light intensity is very much effective for Fragile crops, these Fragile crops needs its required amount of protection from the light intensity. UV sensor covers UVA, UVB range of index. Further

3.9 DC MOTOR

DC Motor is used to supply water from the water storage or tank. The motor is connected through the Node MCU, when the sensor sends information about the moisture level of soil then micro-controller allow the motor to pull

up the required amount of water and provide to the crops, this watering condition is maintained by moisture sensor. Motor pump needs a certain amount of power which is provided by the system itself.

4. IMPACT OF CLOUD COMPUTING

Cloud computing helps in data transferring of plants and crops related to salinity, temperature, humidity etc. This helps in farmers to maintain the crop and its management i.e. suggestions come from the expert department vice versa. It makes the life of farmer more comfortable system is easy to use. They don't have to worry about crop related problem, every problem will be maintained by sensor. Cloud computing also helps to store the data for pre assumption condition regarding crops. They may also for taking necessary precaution earlier from the study data, or experts may direct suggest what precaution should take and more important what will be the amount of precaution should be taken and how it will work. This is only possible in cloud computing, exchanging or interchanging of data. Although by the help of cloud computing we can also monitor the sensor. By the help of cloud, we not only reduce unnecessary human load and also ease the daily life problem.

5. CLOUD IOT IN AGRICULTURE

Now here comes the reason of security, for this purpose cloud having three services which is provided to the users, with the help of these services we can easily secure the data. The three services are as follows-

Software as a Service (SaaS)

Infrastructure as a Service (IaaS)

Platform as a Service (PaaS)

With the mixture of the Cloud computing and IOT the farmers are getting more and more benefit as per their need. This makes the life of farmers more lenient. But the system will be provided as per their cost, obviously the cost is also varying for the system. But as per keeping in mind about the farmer the system will be cost efficient and easy to use.

6. CONCLUSION

The proposed system has successfully shown the Precision Agriculture is maintained by the Cloud Computing and IoT and through various sensors as per their need. With the help of this proposed system we also able to manage the loss of water. Previously the main problem was productivity of crops through a certain condition of environment that was affecting very much, in this paper this problem is also solved. Another problem was cost, this proposed system is cost efficient and also easy to use for farmers. This system is very useful and hence it reduced the work load and toiling of farmers, farmers can easily monitor the system by using smart phones. This also helps to collect the accurate data which is most important for better growth and production.

7. FUTURE SCOPE

In future a more advanced technology shall be introduce regarding weather prediction. A system which can pre assume about weather and climatic condition and shall perform necessary action against weather and climate. This system fails in pre-assumption of weather and climatic condition.

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