

A Literature Review on Controlling and Monitoring Plant Respiration System Using Cloud Computing and Internet of Things (Iot)

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Abstract: For development of a novel and multipurpose smart agriculture, different physiological parameters of plants are control, monitor and analyse using cloud computing and internet of things (IOT). Analysis of different physiological parameter of plants such as Temperature, Humidity, soil moisture, water level, light intensity, CO₂ emission, transpiration rate, & pH value for monitoring and controlling plant respiration system. Wireless Sensor and IOT provides the data acquisition with multiple node place in different location of the country. The final product is to develop the smart agriculture benefit of the farmer growth.

Keywords: Plant Respiration, Physiological, Smart Agriculture, Controlling, Monitoring

1.Introduction

Internet of things now a growing trend in India's agriculture, Internet of Things (IoT) considered to be the new age technology revolution by Department of Telecommunications (DoT), Government of India, has already impacted the country's agriculture sector over the last few years.

Imagine the use of smart sensors, telecommunication and power of Information Technology (IT) for real time monitoring of crop health, checking of soil vitals, developing smart irrigation facilities and many more for smart agriculture. Not yet a giant in global market but India is growing fast. Lack of awareness among farmers a major challenge for the researchers. Paucity of knowledge among farmers to use agricultural machinery incorporating a higher level of technology has served as the major challenge for players in the ecosystem. So for making farmers work easy, novel technology is developed using Internet of Things (IOT) and wireless sensor.

The creators and system integrators should develop their IoT based products keeping their customers in mind, said the major players. The methodology and thought process required to build a product for farmers are different from technology products developed for urban crowd as most farmers are

illiterate and hardly have knowledge on technology. Creators need to focus on UX/UI in cases of digital products and also focus on the language that a product uses to communicate the needful to farmers.

The system could create an excellent set for those peoples who want to live in rural area. Moreover, during plant growth from sowing to harvest time, the methods adopted in the smart agriculture system require little hand-operated contribution, interference regarding physical presence and expertise in a domain knowledge of plants, environment control and operation to maintain and control the growth of the plant.

2.Literature Review

D. Pimentel, B. Berger, D. Filiberto [2], research on "Water resources: agricultural and environmental issues". **Water is essential for maintaining an adequate food supply and a**

productive environment for the human population and for other animals, plants, and microbes worldwide.

D.Pimentel, B. Berger, D.Filiberto [2]., studied on providing adequate quantities of pure, fresh water for humans. Plants require water for photosynthesis, growth, and reproduction. The water used by plants is nonrecoverable, because some water becomes a part of the chemical makeup of the plant and the remainder is released into the atmosphere.

Water is saved by following some methods as: Farmers should implement water-conserving irrigation practices, such as drip irrigation, to reduce water waste. Similarly, farmers should implement water and soil conservation practices, such as cover crops and crop rotations, to minimize rapid water runoff related to soil erosion. So, here in this research essential amount of water is saved for agriculture but here is also need to know the physiological characteristics of plants in order to develop smart agriculture. Thus, after studying this literature review we thought to develop a system for enhancing the agriculture system by controlling and monitoring various physiological characteristics of plants.

E. Playán and L. Mateos [7], research on “Modernization and optimization of irrigation systems to increase water productivity,” *Agricultural Water Management*. A number of irrigation modernization and optimization measures are discussed in the research. Particular attention was paid to the improvement of irrigation management. The purpose of this research is water management in agriculture by modernization and optimization of Irrigation system. So this is why we thought to improve agriculture system by analysing and controlling the plant respiration system.

R.Qui, s. Wei, M.Zhang et al [9], studied on “Sensors for measuring plant phenotyping: a review,” *International Journal of Agriculture and Biological Engineering*. This research presents a brief review on the parameter measurement for phenotyping to describe its development in recent years. Some parameters that have been measured in phenotyping are introduced and discussed including plant height, leaf parameters, in-plant space, chlorophyll, water stress, and biomass.

In this research, measurement usually focuses on some crop stand parameters. These parameters can be divided into morphometric and physiological parameters. The morphometric parameters, including plant height, stem diameter, leaf area or leaf area index, leaf angle, stalk length, in-plant space, and the physiological parameters such as chlorophyll, photosynthetic rate, water stress, biomass, salt resistance, and leaf water content, which can all influence or represent the growth of a plant. So, we thought to develop a system for more improvement in smart agriculture system by analysing plant respiration system and its physiological parameters more deeply.

3.Methodology

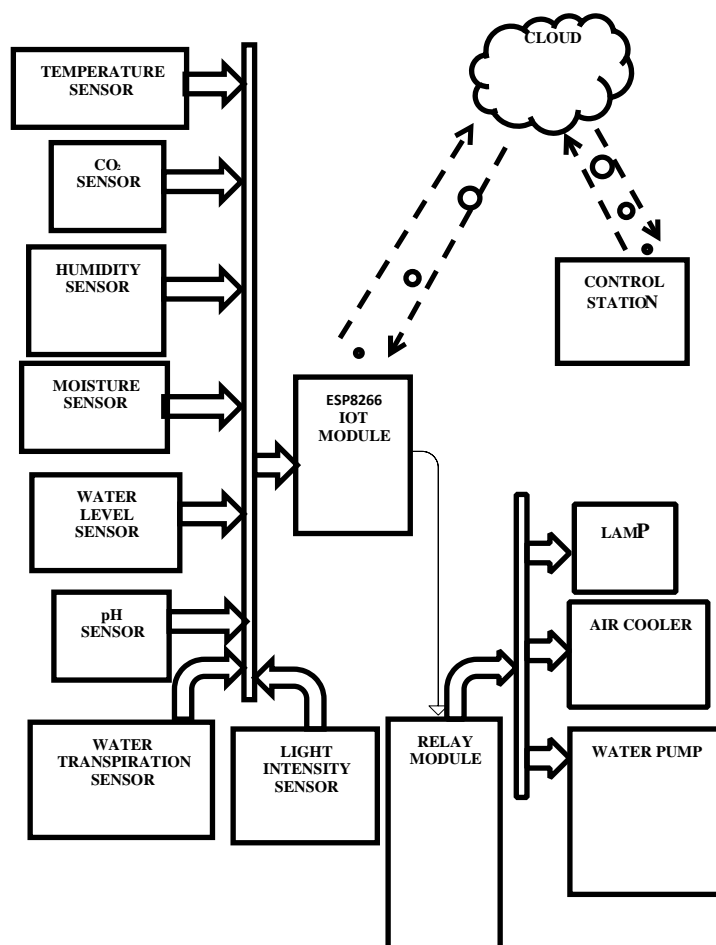
During the plant cultivation, several steps including temperature, humidity, light intensity, water nutrient solution level, pH and EC value, CO₂ concentration, atomization time and atomization interval time required for flourishing plant growth.

- Therefore, the object of proposal to provide significant knowledge about early fault detection and diagnosis in plant cultivation using intelligent techniques (wireless sensors) and IOT.
- The parameter like temperature, humidity, moisture, water level, pH value, water transpiration, CO₂ discharge, effect of light intensity are the wireless sensor as input parameter.

- Whereas some are the output parameter like light intensity, air cooler, and water pump.
- The temperature of plant and surrounding is sense by the LM 35 temperature sensor and fed to ESP module with analog data. This data will transfer to the Cloud using IOT module.
- The humidity of plant is sense by DHT11 sensor. Same as water moisture and water sensor will be transfer to the ESP 8266 module.
- For water transpiration purpose we used the gas pressure sensor, as well as the pH value of the water we can into consider.
- The released of Co2 by the plant will be measure by MCQ 07 sensor.
- All data of different sensor acquiesce by the IOT module and uploaded to cloud. There are different cloud platform is available ubidots is the one of this platform which provides the data analysis as well as data storages.
- The data is access to control section on desktop PC or as mobile app.

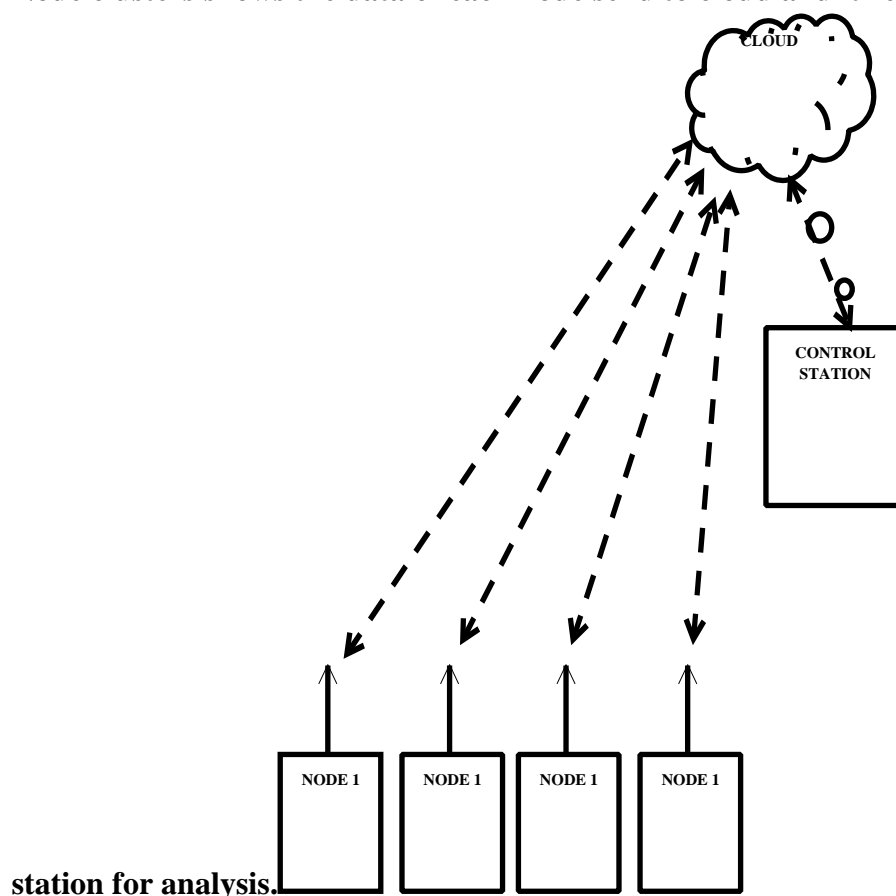
4. Discussions

- A detailed discussion about different sensors, and devices has been presented in this section.
- The block diagram shows the node block diagram for plant. In this project proposal the different sensors are used to measure the physiological parameter of plant.



**FIG 1. NODE BLOCK
DIAGRAM FOR PLANT**

- **Node clusters** shows the data of each node send to cloud and it recovers at the control



5. Conclusion

This article has presented a systematic literature review which is basically based on agriculture development. Analysis of different physiological parameters in order to develop a smart agriculture system. And by using IOT and wireless sensor, controlling different physiological parameters are studied. This project discuss the different practice is undertaken by the farmers. Due to the dynamic climate change are facing a number of problems in tradition farming technique so a new technological dependant monitoring system is required in agricultural practice to balance the food demand in current situation.

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