

Smart Green House using IOT and Cloud Computing

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Abstract - Smart Green House android app is succeed to observe and managing the microclimatic environment inside a Green House. From the green house easily get soil moisture, humidity and temperature sensor value to android app, according to sensors values and we set predefined threshold values for each sensor, depending on sensor readings we are going to control using water sprayer, cooling fan, rooftop and focus light and just press the button in android app we can make on/off motors and it also has datasheet of all horticulture plantation and season wise precaution material for monitoring and controlling. The intention of this project is to design a simple, easy to install, user friendly to monitor and record the values of temperature, humidity, soil-moisture and sunlight of the natural environment that are continuously modified and controlled in order optimize them to achieve maximum plant growth and yield. The result shows that the situation specified in sensor's database and system in actually is proper. The achieved test result concludes that the system is working properly.

1. INTRODUCTION

Greenhouses form an important part of the agriculture and gardening sectors in our country as they can be used to grow plants under managed climatic conditions for optimum produce. Automozed a greenhouse envisages observing and managing of the climatic parameters which directly or indirectly govern the plant growth and hence their produce. Agriculture is always been main business in India containing 60% of people. Still compare to other countries India need to improve performance. Greenhouse is best option to enhance the performance. Still hand-operated Greenhouse has some drawbacks like visual inspection of the plant growth, hand-operated irrigation of plants, turning on and off the temperature controllers, hand-operated spraying of fertilizers and pesticides. It is time consuming, vulnerable to human error and hence less accurate and unreliable. So fully automatized Greenhouse is a best solution. Remove the difficulties involved in the system by decrease human involvement to the best possible area. The sensors sense the change and raspberry-pi reads this from the data at its input ports (GPIO). Greenhouses form an important part of the agriculture and gardening sectors in our country as they can be used to grow plants under managed climatic conditions for optimum produce. Automating a greenhouse envisages monitoring and controlling of the climatic parameters which directly or indirectly govern the plant growth and hence their produce.

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2. RELATED WORK

1. Sheetal Vatari, Aarti Bakshi, Tanvi Thakur says that Green House is the best solution to control and manage all this problem It is more important to search a method that gives perfect analyzation and controlling to develop proper environment. Large areas covered by sensor network this can establish greenhouse with precision environment required for different crops. This environment builds up by using two technologies it and cloud computing. By using IOT(Internet on things) we control devices or any environmental needs anytime, anywhere and the cloud which provides storage.

Ravi Kishore Kodali, Vishal Jain and Sumit Karagwal say that This work provides a model of a smart green house, which helps the farmers to carry out the work in a farm automatically without the use of much hand-operated inspection. The irrigation of agriculture field is carried out using automatic drip irrigation, which operates according to the soil moisture threshold set accordingly so as optimal amount of water is applied to the plants.

3. Uday A. Waykole, Prof. Dhiraj. G. Agrawal says that temperature and humidity are related in a way when temperature raises humidity reduces therefore controlling both together is difficult. Because the temperature and humidity of greenhouse must be constantly monitored to ensure optimal conditions, a wireless sensor network can be used to gather the data from point to point. The data from the greenhouse will be measured by the sensor and the data that are collected will be sending to the receiver. The data that has been read will be displayed on the LCD screen.

4. Bharat Institute of Technology issued a report on

„The Project Green Bee“ based on Monitor and Control of greenhouse environment. According to the report, the system is modeled for the automation of greenhouse using embedded system.

5. Jia Song, He proposed a system on Greenhouse Monitoring and Control System using 8051 controllers.

3. PROPOSED WORK

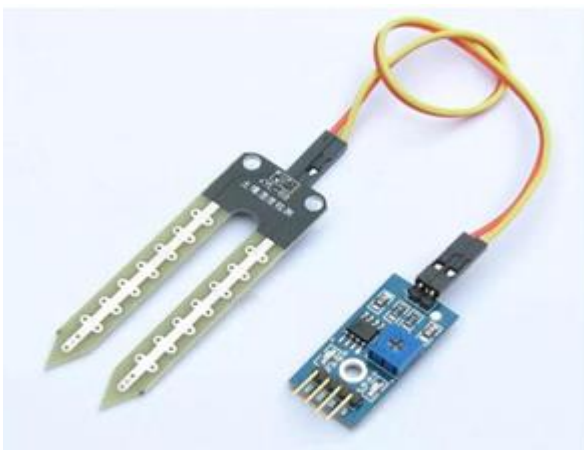
The advanced system is an implanted system which will closely observe and control the microclimatic variables of a greenhouse on a continuous basis round the clock for farming of crops or specific plant species which could maximize their production over the whole crop growth season and to eliminate the difficulties involved in the system by reducing human intervention to the best possible extent. The raspberry-pi then executes the needed works by occupying relays pending the strayed-out variable has been conducted back to its optimum level. Since a raspberry-pi is used as the heart of the system, it makes the set-up low-cost and effective nevertheless. The system also provides continuously alert messages the user about the condition inside the greenhouse by using cloud services. The system contains of sensors, Analog to Digital Converter, microcontroller and actuators. When any of the above declared climatic variables cross a protected threshold which has to be maintained to safety the crops, the sensors sense the change and the microcontroller reads this from the data at its input ports after being transformed to a digital form by the ADC. The microcontroller then executes the needed actions by occupying relays pending the strayed-out variables has been conduct back to its optimum level. Since a microcontroller is used as the heart of the system, it makes the set-up low-cost and effective nevertheless.

4. METHODOLOGIES

SENSORS

1. SOIL MOISTURE:

Soil moisture sensors measure the volumetric water content in soil. Since the direct gravimetric measurement of free soil moisture requires removing, drying, and weighting of a sample, soil moisture sensors measure the volumetric water content indirectly by using some other stuff of the soil, such as electrical resistance, dielectric constant, or interaction with neutrons, as a proxy for the moisture variable. Soil moisture sensors typically refer to sensors that estimate volumetric water content.



2. TEMPERATURE

The sensor panel itself has both analog and digital outputs. The analog output gives a parameters voltage rating that allows guessing the moisture satisfied of the soil. The digital output gives a simple –on/off|| when the soil moisture content is above a certain value

In general a temperature sensor is a device which is outline specifically to measure the warmth or cold of an object. DHT11 is a precision IC temperature sensor with its output proportional to the temperature (in °C). With DHT11, the temperature can be measured more accurately than with a thermistor.

3. SUNLIGHT

The light dependent resistor or also known as LDR sensor is the most important slice of apparatus in circuit. Without it, it is impossible to detect whether it is dark or light. In the light this sensor will have a resistance of a few hundred ohms while in the dark it can have a several mega ohms.



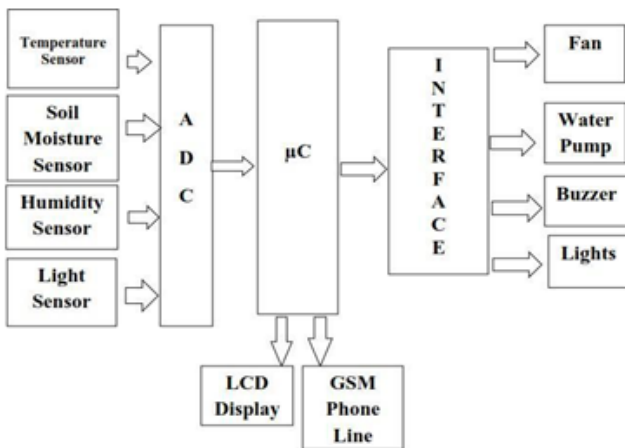
4. RASPBERRY-PI:

The is a series of credit card-sized single-board computers developed in the United Kingdom by the Raspberry Pi Foundation to promote the teaching of basic computer science in schools and developing countries. A Raspberry Pi is a general-purpose computer, usually with a Noobs operating system, and the capacity to run multiple programs. Raspberry Pi is best used when you need a fully-developed computer: driving a more complicated robot, performing multiple tasks, doing intense calculations. Raspberry Pi board is a fully functional computer or fully-developed credit card sized. It has all the trappings of a computer, with a dedicated memory, processor, and a graphics card for output through HDMI. It even runs a specially outline version of the Noobs operating system and it is easy to install in most Noobs software, and used the Raspberry Pi as a functioning video game emulator or media streamer with a bit of effort.

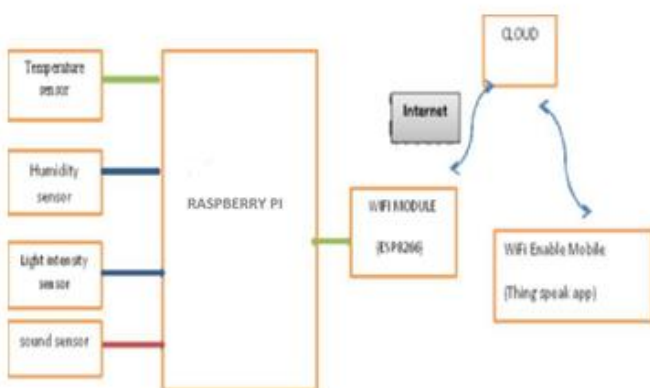


5. SYSTEM DESIGN

5.1 SYSTEM ARCHITECTURE



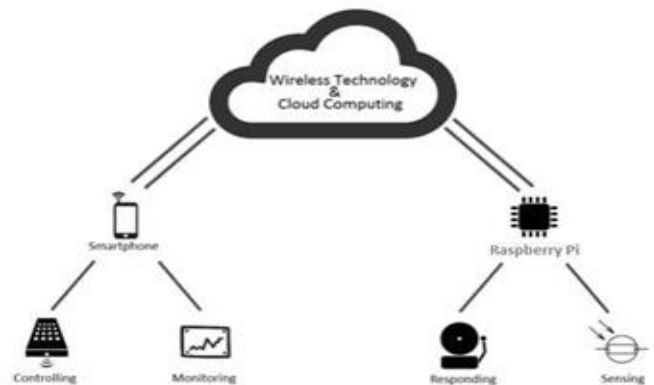
5.2 LOCK DIAGRAM



6. CLOUD COMPUTING

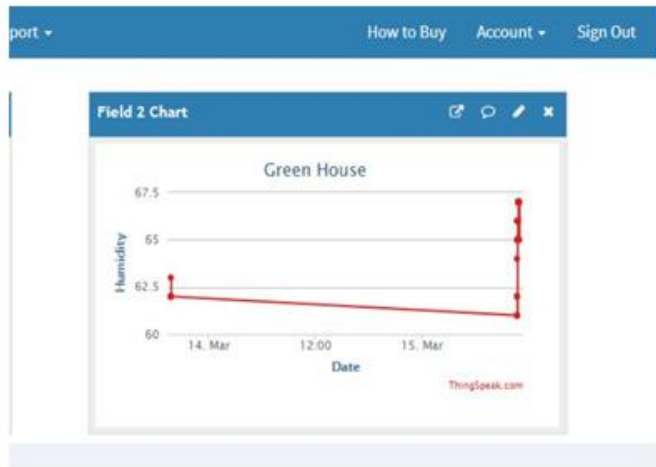
Cloud computing Services provide information technology (IT) as a service over the Internet or dedicated network, with delivery on demand, and payment based on usage. Cloud computing services range from full applications and development platforms, to servers, storage, and virtual

desktops. Cloud computing is a general term for the delivery of hosted services over the internet. Cloud computing enables companies to consume a compute resource, such as a virtual machine (VM), storage or an application, as a utility -- just like electricity -- rather than having to build and maintain computing infrastructures in house. Cloud computing is a type of computing that relies on sharing computing resources rather than having local servers or personal devices to handle applications. In cloud computing, the word cloud is used as a metaphor for "the Internet," so the phrase cloud computing means "a type of Internet-based computing," where different services — such as servers, storage and applications — are delivered to an organization's computers and devices through the Internet. Cloud computing is a method for delivering information technology (IT) services in which resources are retrieved from the Internet through web-based tools and applications, as opposed to a direct connection to a server. Rather than keeping files on a proprietary hard drive or local storage device, cloud-based storage makes it possible to save them to a remote database. As long as an electronic device has access to the web, it has access to the data and the software programs to run it. It's called cloud computing because the information being accessed is found in "the cloud" and does not require a user to be in a specific place to gain access to it.



7. RESULTS





8. CONCLUSION

India is an agriculture-oriented country. For the quality and Productivity improvement of greenhouse and open field crops, it is necessary to measure and control several interacting physical variables. These tasks can only be accomplished by ‘control systems with built in software’.

Erecting greenhouse is expensive. Automation machinery is imported in India hence it is expensive. Many farmers cannot adopt the greenhouse technology due to its high cost. Our system highlights about the approach to control the environment in Greenhouse. The greenhouse controller senses the changes in the temperatures (Dry temperature, Wet temperature), humidity, soil moisture etc. through input sensors and processes to take control action.

Real time monitoring supplies reliable, timely information of crop and soil status, important in taking decisions for crop production upgrade. Evaluation of agricultural production systems is a time consuming and difficult process because it means performing visits to selected crop fields to be able to measure and register certain physical, chemical and biological characteristics of the cultivated areas and analysis of all input parameters.

9. REFERENCES

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5. Muhammad Ali Mazidi, Janice Gillispie Mazidi, Rolin D. Mc Kinlay , The 8085 Microcontroller & Embedded Systems, Pearson Education Inc. 2nd Edition,2008.
6. He, Guomi Wang, Xiaochan; Sun, Guoxiang .They had discussed about humidity and moisture monitoring in green house using Zigbee monitoring system.
7. Jia Song, He proposed a system on Greenhouse Monitoring and Control System using 8051 controller.
8. In this project we have discussed about Greenhouse Monitoring and Control System Base on microcontroller Wireless Sensor Network using ARM controller. The parameters in the green house are monitored on the PC. In this project we have proposed a low cost method microcontroller to accurately monitor and control the various parameters like humidity, soil moisture, light intensity carbon dioxide (gas sensor) and temperature.