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Smart Kitchen Gardening

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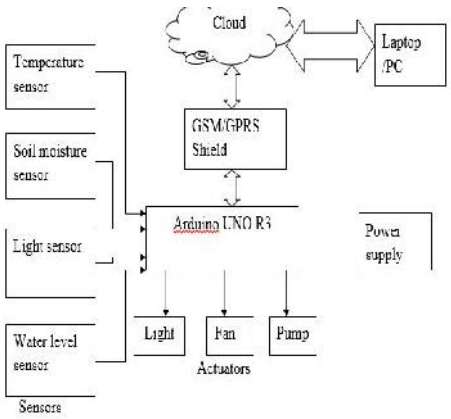
Abstract:*A greenhouse is essentially a structure designed with roof and walls made up of glass/clear plastic so that it heats up due to incoming solar radiation from the sun, thus warming the soil, the plants, and other items enclosed in it. The proposed greenhouse system is an application which demonstrates the concept of Internet of Things and involves ubiquitous monitoring and controlling of environmental parameters within the greenhouse, which directly or indirectly control the plant growth and so their production. . Hence by integration of sensing technology, actuator nodes and the wireless communication over the internet to form a system, the monitoring of the greenhouse can be made ubiquitous, thus making this system an application of IOT. The data collected from the sensors within the greenhouse is visualized in real-time using the concept of cloud instrumentation and also stored over a period of time for further research activities.*

1. INTRODUCTION: Since ancient times, human labor has always played a major role in monitoring crops. Having said that, certain species of plants such as vegetable and flowering plants require continuous human attention to achieve high quality and quantity. As a result, proper data collection and management become imperative. A 'smart' greenhouse can be used in such a scenario, to annihilate the problems. It will provide enormous foundation for growth and healthy development of the plants in the greenhouse. As a greenhouse is essentially a structure designed with roof and walls made up of glass/clear plastic so that it heats up due to incoming solar radiation from the sun, thus warming the soil, the plants, and other items enclosed in it. In other words, glass structure provides protection as well as a controlled and required environment which allows us to mimic the climate of any section of the world, thus yielding us produce throughout the year. The word ubiquitous means 'found everywhere'. The aim of having a ubiquitous monitoring environment using sensors is to provide continuous management of plant's growth so that abnormalities can be predicted and avoided. Hence by integration of sensing technology, actuator nodes and the wireless communication over the internet to form a system, the monitoring of the greenhouse can be made ubiquitous, thus making this system an application of IOT. The data collected from the sensors within the greenhouse is visualized in real-time using the concept of cloud instrumentation and also stored over a period of time for further research activities.

2.BLOCK DIAGRAM:



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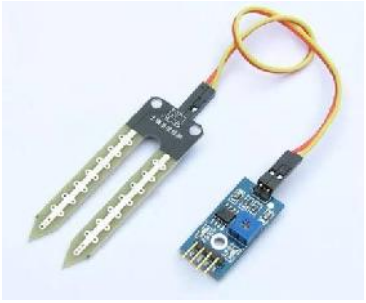
3. Proposed system: The proposed model consists of a Arduino as a main processing unit for the entire system and all the sensors and devices can be connected with the microcontroller. The sensors can be operated by the microcontroller to retrieve the data from them and it processes the analysis with the sensor data and updates into the cloud through Wi-Fi module connected to it. Here we are using Arduino because it is compatible with 3.3v ESP8266 Wi-Fi module and it also contain more than one on chip UART's so we can connect more number of Serial devices. A relay is an electrically operated switch. A type of relay that can handle the high power required to directly control an electric motor or other loads is called a contactor. Solid-state relay control power circuits with no moving parts, instead using a semiconductor device to perform switching. The ESP8266 Wi-Fi Module is a self-contained SOC with integrated TCP/IP protocol stack that can give any microcontroller access to your Wi-Fi network. The ESP8266 is capable of either hosting an application or offloading all Wi-Fi networking functions from another application processor.Internet of Things (IOT) platform that lets you collect and store sensor data in the cloud and develop IOT applications. The IOT platform provides apps that let you analyze and visualize your data.

4.Hardware:

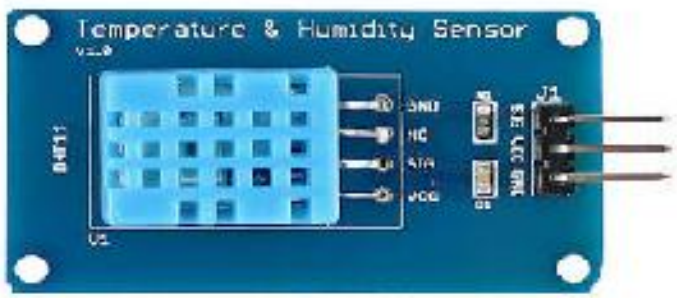
4.1 Soil moisture sensor

This sensor is interfaced with microcontroller and programmed. Once it is programmed it is placed inside a box and kept in field. The soil moisture sensor has two probes which is inserted into the soil. The probes are used to pass current through the soil. The moisture soil has less resistance and hence passes more current through the soil whereas the dry soil has high resistance and pass less current through the soil.



4.2 Temperature and Humidity Sensor

The total amount of water vapor in air is defined as ameasure of humidity. Relative humidity is calculatedbecause when there is a change in temperature, relativehumidity also changed. The temperature and humidity changes occur before and after irrigation. the temperature and humidity sensor can also be used in green houses.



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4.3 Light Dependent Resistor

Light sensor is used to detect light intensity of environment.Light is major source for crops which is responsible for photosynthesis. Light dependent resistor is used in resistivity decreases with increases in high intensity and vice versa. The voltage divider circuit is designed to measure resistance due to light intensity variations. The voltage level increases with increase in light intensity. The analog readingis taken from board. It is used in green house where artificial lighting is done using any of the incandescent lamps, fluorescent lamps instead of sunlight.

5. Methodology:-

Cloud computing: Cloud computing is a type of computing method based on the internet, which is used to share software and hardware information to be delivered to computers and other equipment on demand. Cloud computing defines a new way of adding, using and exchanging IT service based on the internet which involves providing dynamic, expandable and most of the time virtualized resources by using the internet. Generally speaking, cloud computing has five features as follows: on-demand service, internet access, resource polling, rapid elasticity and calculability.

Internet of things:it is defined as the IOT =cloud computing + intelligent sensing network+ubiquitous network. Cloud computing management is the “brain” of cloud computing and the relevant data. It involves the management of accession of cloud computing customization application by users of the IOT, computing and processing what is involved in customization service; organizing and coordinating the service nodes in the data center. Ubiquitous network includes the 3G, LTE, GSM, WLAN, WPAN, Wi Max, RFID, Zigbee, NFC, bluetooth and other wireless communication protocol technology. It also includes optical cable and other wire communication protocol and new technology.

Arduino: The Arduino comprises of a serial monitor, which allows textual data to be sent to and from the Arduino UNO board.The testing of final Arduino code for proper functioning of sensors and actuators is shown using the serial monitor output. The intial threshold values are entered during system set up.The aurdino considers thesepredefined threshold values to control the actuators automatically.The system works automatically when not in manual control mode. In order to control the temperature, soil moisture and light intensity within the green house, appropriate actuators will be turned off or on automatically.

Working:

In our project, plant is surrounded by DHT sensor, LDR and water level sensor. These sensors collect the data from the plant like temperature range, water level, moisture content of the soil. Through Arduino code is generated for these sensors. The sensors data is dumped in to the nodemcu module by esp8266. Now the information of sensors can be seen in webpage.

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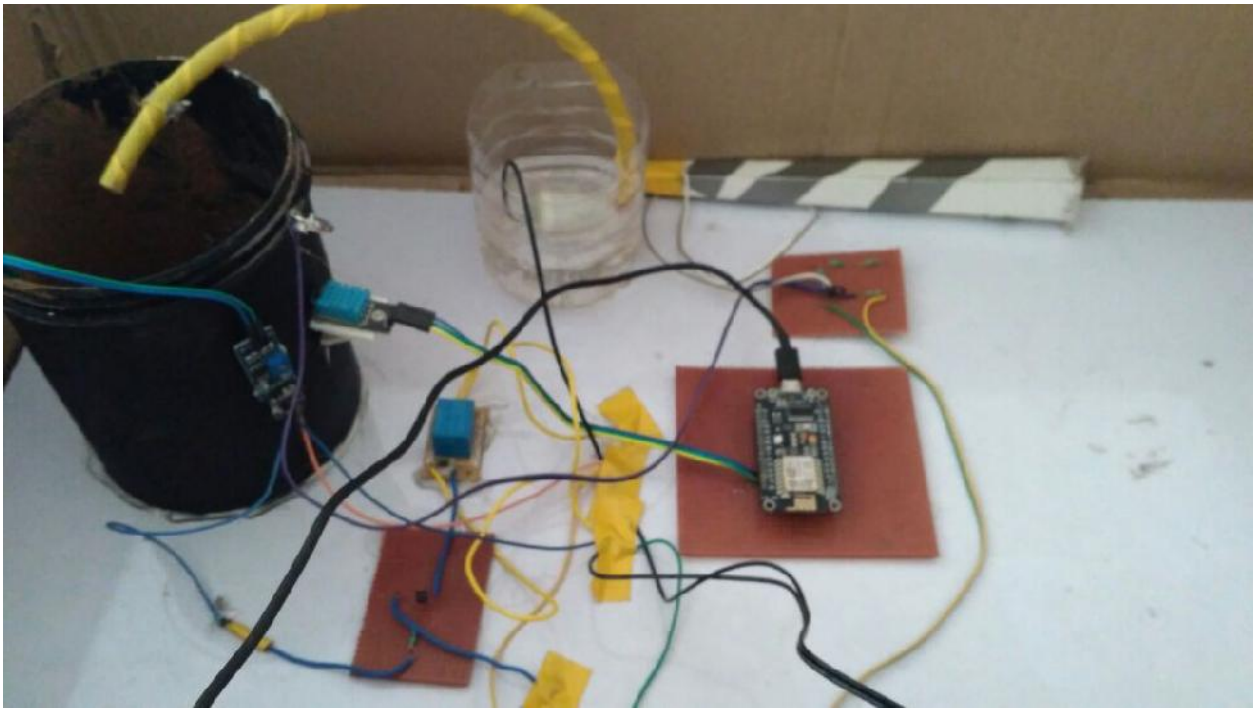
Conclusion:

The practice of ubiquitous monitoring and control enhances the former methods of collecting and analyzing data in the agro-environmental system. Automated control of actuators considerably reduces power consumption by efficient use of resources, as well as cost of manual labor's step-by-step approach of designing the ubiquitous greenhouse monitoring system is followed to obtain a secure, reliable and cost-efficient system. Applications of the system can be extended for large scale-implementation in agriculture industry. Modifying certain features of the system such as changing the combination of sensors, the proposed system can be used in ubiquitous monitoring and control of other environments such as home, office etc. The performance of the system can be further improved in terms of the operating speed. Also, greenhouse location awareness and anti theft using GPS , CCTV cameras ,infrared sensors can be implemented. Time bound administration of fertilizers, insecticidies and pesticides are a few other features that can also be implemented.



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