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Greenhouse Environment Monitoring and Controlling Through IoT

M. Renubabu Naik[1], Dharavath Nikhil Naik[2], Shaik Hafeez Basha[3], K. Jeevan Reddy[4]
[1, 2, 3]*Students,* [4]*Internal Guide, Associate Professor of Department of Electronics and Communication Engineering, SNIST, Hyderabad, India.*

Abstract: ***Our project is based on IOT (Internet of things) which is very useful for monitoring and controlling the greenhouse environment, Agriculture under the greenhouse environment has more benefit of getting more crops by making proper climatic conditions for plants, fruits and vegetables. This greenhouse monitoring environment system have the transparent paper on the top and it contains the five main sensors they are temperature, humidity, rain, soil, LDR sensors. Most of the farmers are fail to get good crops by various reasons such as diseases due to temperature and humidity, if farmers really concerned about suitable temperature and humidity then they can get good crops and this can possible by providing greenhouse environment.***
The Arduino Nano is the heart of this project, and the five sensors are senses of their respective value and send to the Arduino Nano, through Wi-Fi module the respective detected value is monitored on the smart mobile where Wi-Fi controller app is there. Temperature sensor detects temperature, if temperature exceeds the threshold value then the fan is automatically on, there by temperature are decreases in the greenhouse environment. If LDR detects the sunlight then light will be off and when the sunlight not fall on the LDR then the light will be on in the greenhouse environment.
If Rain sensor detects Rain then through the Wi-Fi controller we can open the top of the Greenhouse environment. The top is to be closed after the rain stop, by the Wi-Fi controller. If Soil sensor detects soil is to be dry then automatically the water pump is ON, and water pump is OFF automatically when soil becomes wet.
Keywords: Arduino Nano, Temperature sensor, Rain sensor, Soil sensor, LDR sensor, DC fan, Servomotor etc.

I. INTRODUCTION

A conservatory is a expose region where location plants grow and develop. It's also called dry land of inhibited plants and crops. A glass house ecological authority structure be in debt to the relation of a lot of ecological adaptable influence of extension and construction. The internet of things allows devices to be percepted in passing through live network architecture/configuration to generate opening for either straight absorption of the bodily physical world into computer based system and arising in enriched producing excutness and provident advantage in expansion to be decreased human arbitration. Temperature and LDR sensors are the major essential sensors that employ in this operation whatever gives precise assets of power, temperature, soil, and moisture etc. as individually Keep on observing of such elements required applicable details obtaining to the separate reaction of the numerous components towards acquiring maximum crop presentation These particulars is acquirer from various sensors location and transferred through Wi-Fi module to Wi-Fi controller application in order to fetch all related data on as real screen of this system.

II. HARDWARE AND SOFTWARE REQUIREMENTS

A. Hardware Components

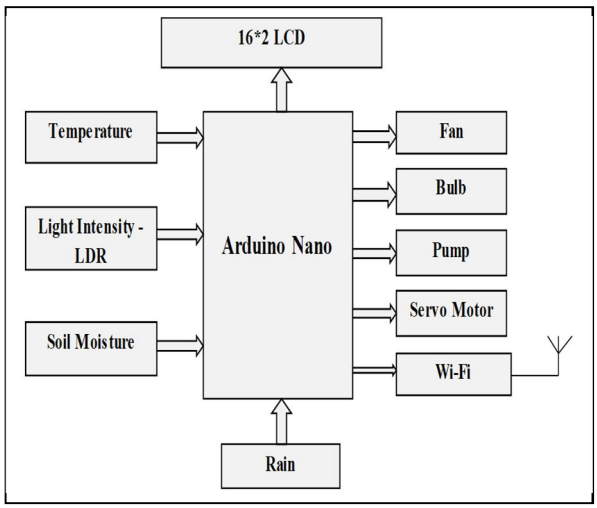
1) Wi-Fi module ESP8266
2) 16x2 LCD
3) Arduino Nano
4) Temperature sensor
5) Soil moisture sensor
6) Rain sensor
7) LDR sensor
8) DC Fan
9) Servo motor
10) Water pump
11) Bulb

B. Software Components

1) Arduino IDE software.

III. BLOCK DIAGRAM

Block Diagram



IV. WORKING PRINCIPLE

For the working the Greenhouse will be installed with temperature sensor, light sensor, rain sensor, Soil moisture sensor. To show case that we cover the light sensor, as we can see in the LCD screen and the IOT application display is that the light present is dropped and the light is getting switched ON to overcome the same light condition. When the light sensor senses the light again the bulb is switches OFF automatically.

A. Temperature Sensor

Moving on the temperature sensor which is installed in the greenhouse to show the temperature high, we can see the temperature is increasing as presented on the LCD display and on the Wi-Fi controller app, after a certain temperature with exceeding about the threshold value the fan get automatically switched ON to maintain desired temperature condition. After the temperature condition is normal which is called below the threshold value then fan gets switch OFF automatically.

B. Soil Moisture Sensor

The soil moisture sensor which will be placed in the ground/soil inside the greenhouse to sense the moisture present in the soil, as the moisture in the soil is dropped and it will be sensed by the soil moisture sensor and the pump will get switched ON automatically to restore the moisture condition, that is projected on the LCD screen as well in the Wi-Fi controller app on our smart mobile, as soon as the sensor senses the enough moisture in the soil which makes this condition normal and the pump will get switched OFF automatically.

C. Rain Sensor

The rain sensor which will be placed on the top of the greenhouse to sense the rain, as rain is falls on the rain sensor then on the LCD display as well as in Wi-Fi controller shows the message called “it’s raining” then through the Wi-Fi controller we can give the command called “top open” for opening the top of the greenhouse which is transparent material. After rain stops the LCD and Wi-Fi controller shows the message called “NO rain” then through the Wi-Fi controller we can give the command called “Top closed” for closing the top of the greenhouse.

So, with the help of this project called greenhouse monitoring and controlling through IOT, we can maintain the desired conditions such as climatic conditions for the effective crop growing such as plants, fruits and vegetables. So, this is the working of greenhouse monitoring environment and controlling through IOT platform.

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V. HARDWARE DESCRIPTION

A. 16X2 LCD Display

The LCD is familiar as liquid crystal display, it is a mixture of two states, the liquid and solid it fabricates a visible aspect with the help of liquid crystal. The facts and control are two registers for LCD. It carries 16 pins that are accessible at one side as show in figure below.

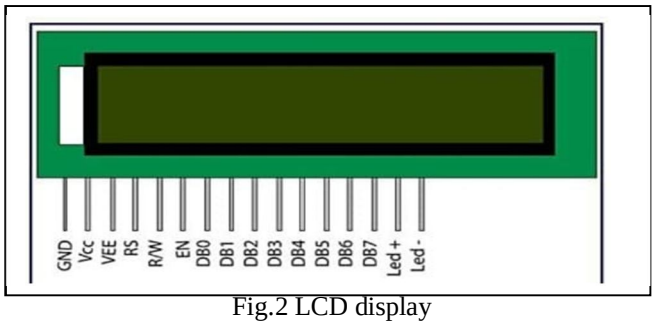

Fig.2 LCD display

B. Soil Moisture Sensor

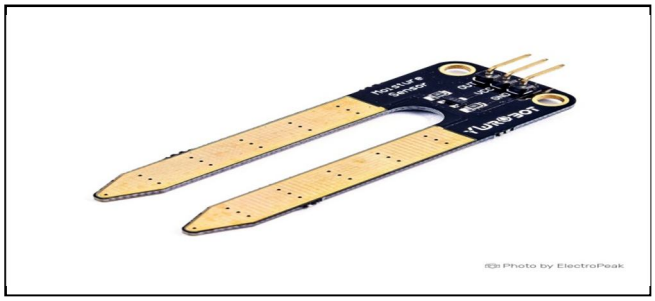

Fig.3. Soil moisture sensor

The self-operating system employs the YL69 sensor to sense the moisture in the soil. This sensor evaluates the quantity about water presented in the soil. Following the shortest volumetric analysis calculation of free drying soil moisture, importance of trial, this sensor measures the volumetric water content.

C. Temperature Sensor

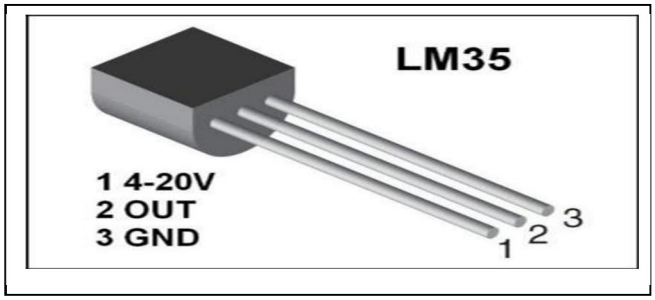

Fig.4. Temperature sensor

Temperature is the most commonly measured physical parameter. So clear calculation is wanted many applications such as research lab electrical and electronics components.

Temperature is the degree of coldness/hotness of any device calculated on a distinct scale as Celsius, Fahrenheit etc. This device is an electronic device such magnitude the temperature of its environment and connects the input data into electronic data to record the changes of temperatures.

D. LDR Sensor

Fig.5. LDR sensor

Light dependent resistor is also known as photo resistor, LDR is a device whose resistivity is a function of the intenent electromagnetic radiation can light that's why they are light sensing devices, they are also called as photo conductors. This is made up of semiconducting materials with high resistance. It works on the principle of photo conductivity is an optical phenomenon in which the materials conductivity is reduced. This LDR are less sensitive than other devices.

E. Wi-Fi Module

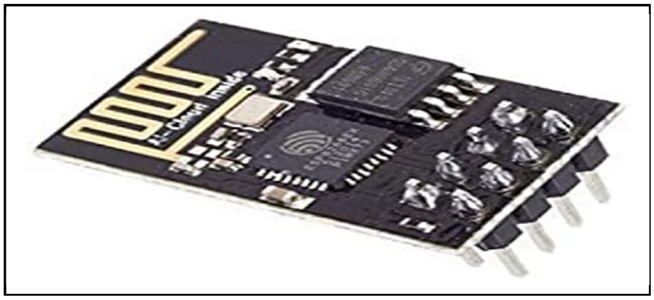

Fig.6. Wi-Fi module

This module is also known as wireless local area network module. This electronic elements secret in many products to accomplish wireless cellular coupling to internet. This Wi-Fi module is used for the growth of finish point IOT. It is also called as MCU.

F. Arduino Nano

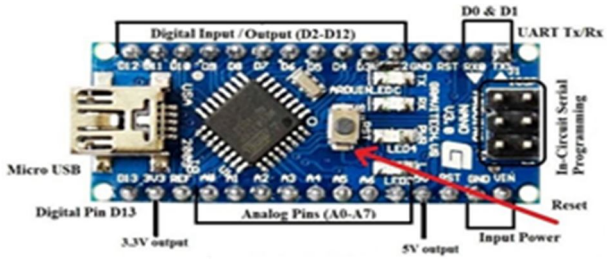

Fig.7.Arduino Nano

It is a microcontroller board designed by Arduino.cc. The microcontroller which is used in Arduino Nano is ATmega328P, it has 12 digital pins from D2-D13, it is also has 8 analog pins starting from A0-A7. These digital and analog pins are designed by multiple functions. We can interface the various sensors depending upon our requirement to the Arduino Nano. If we interface a motor and LCD it is called output. Arduino Nano can perform 3 types of communication protocols which are:- 1) Serial protocol 2) SPI protocol and 3) 12 protocol. Now pin 0 and 1 are used for serial communication. It also has pwm pins, these pins used for pulse width modulation. It also has two reset pins which are used to reset this Arduino Nano, it also uses crystal oscillator of 16MHz frequency. Arduino Nano has 4 LED's and are connected to different parameters such as Rx, Tx power supply and the other one is for pin 13 used for testing. Arduino Nano has three types of building memory associated with it, those memories are named as 1)Flash memory 2)SRAM memory and 3)EEPROM memory. We have mini USB port which is used for powering up and duping the code.

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VI. ADVANTAGES

1) Boost in crop succumb
2) It controls the pest
3) It's capacity is to cultivate tropical plants
4) Domestically it is to be used
5) It is very useful for small geographical formers and greenhouse holders
6) Some people make a living from greenhouse farming

VII. DISADVANTAGES

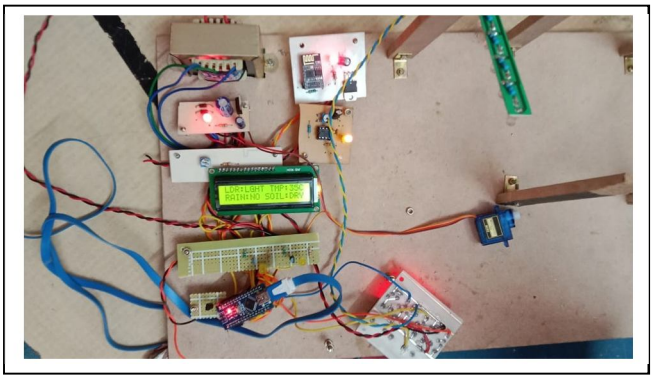
1) Wi-Fi module distance will be very short.
2) Frequency of radio can effect the development of herbs, crops and plants to some boundary.
3) Surviving confect can shadow the plant house, holding light essential for herbs/greenery.
4) Oxygenating and temperature are challenging to check.
5) This greenhouse can be space consuming
6) This system is for finite plant crop yield suitable opportunities.

VIII. APPLICATIONS

IOT based greenhouse environment and managing with observing on Wi-Fi controller app in mobile has main applications which is called as

1) Agriculture
2) Organic farming
3) Botanical gardens

IX. RESULTS & DISCUSSION



Here, the Arduino Nano is a control unit which accumulate all the ingredient concerning the herb/plant development, checking of temperature, rain and LDR sensor along with a small water tank dispatched for contributing enough quantity of H2O to plants, as well as in rainy season if plants wanted water as to survive we have a roof such as to open and close roof whenever we wanted. So as to supply water for plants we can control that particular roof by our self by using the Wi-Fi controller app in our smart mobile.
This whole system called IOT based greenhouse environment monitoring and controlling through sms alert can be controlled by worth of 5v power supply. LCD is located in this proposed system for giving enough content values like soil, temperature, LDR etc., therefore we are also created an IOT mobile app to keep all the updated details about the development of plants. LCD display expose the reading values of rain, temperature, soil moisture and LDR.

X. CONCLUSION

An intelligent greenhouse observation technique/methodology owns which has been instrumented fortunately or famously using the idea of internet of things which can demonstrate to be a benefit by considering forming sector, not only in farming sector but also in horticulture.
The modern methodology for greenhouse observation is to work in-depth and exhaust. This advanced methodology refuses date, time, and human attention.

It delivers a disciplined habitat for the small herb and consequently accelerates the all-inclusive resist. The intelligent greenhouse extensively to develop the numerous framework for the herb/plant.

At last it receives the factual time details of framework to the Wi-Fi mobile application for running and efficient monitoring.

REFERENCES

[1] Tanu Saha, Ashok Verma, "Automated Smart Irrigation system using Raspberry Pi", International Journal of computer applications, Vol 172-No.6, August 2018.

[2] Nikhil Agrawal, Smita Singhal, "Smart Drip Irrigation system using Arduino", IEEE sponsored International Conference on computing, communication and automation, 2015.

[3] Ullas S Patel, Saiprasad, Shravankumar and Veerabhadra K J, "Green House Monitoring and Controlling Using Android Mobile App", International Journal of Combined Research & Development (IJCRD), Vol. 5, Issue 5, May 2016.

[4] Choppara Manendra Babu and S. Saidarao, "Modern Agricultural Management and Greenhouse Monitoring System based on Wireless Communication ", International Journal of Engineering Research and Technology(IJERT), Vol. 5, Issue 2, February 2016.

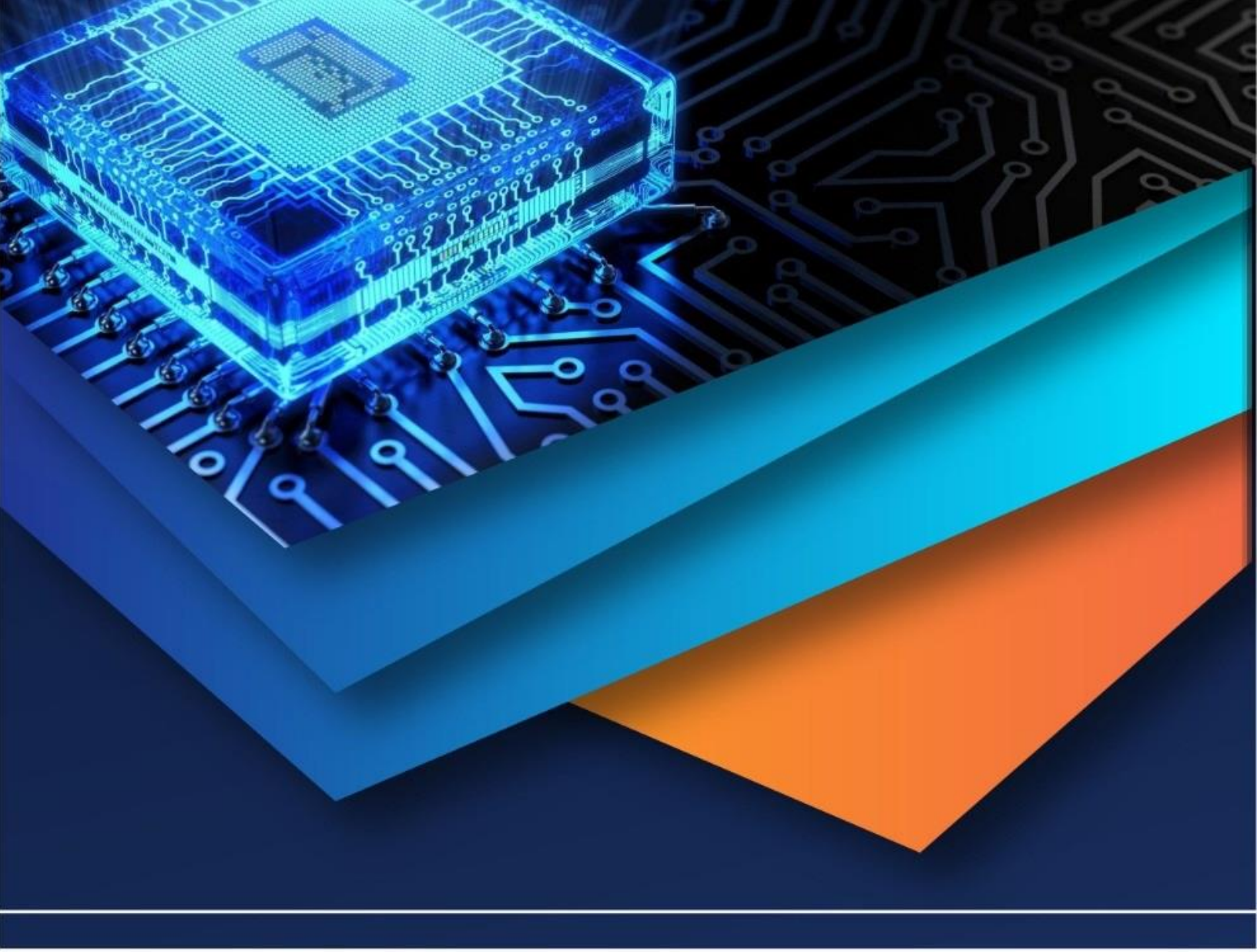
[5] N. Castilla, Greenhouse Technology and Management, 2nd ed. Oxfordshire: CABI, 2013.

[6] Y. Hashimoto, "Computer Control of Short Term Plant Growth by Monitoring Leaf Temperature," in Acta Horticulturae, 1980, no. 106, pp. 139–146.

[7] V. Aror, D. Malonda, M. Patabo, and Y. Putung, "Utilization of Solar Cells as Energy Sources for Heating and Fan (Ex-house) in White Copra Dryers with Arduino Uno as Temperature Control," in 2018 International Conference on Applied Science and Technology (iCAST), 2018, pp. 521–525.

[8] K. V De Oliveira, H. M. Esgalha Castelli, S. J. Montebeller, and T. G. Prado Avancini, "Wireless Sensor Network for Smart Agriculture using ZigBee Protocol," in 2017 IEEE First Summer School on Smart Cities (S3C). Proceedings, pp. 61–6.

[9] M. S. Kumar, T. R. Chandra, D. P. Kumar, and M. S. Manikandan, "Monitoring moisture of soil using low cost homemade Soil moisture sensor and Arduino UNO," in 2016 3rd International Conference on Advanced Computing and Communication Systems (ICACCS), 2016, vol. 01, pp. 1–4.



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