IOSR Journal of Engineering (IOSRJEN) **www.iosrjen.org**
ISSN (e): 2250-3021, ISSN (p): 2278-8719
PP 33-35

Greenhouse Monitoring and Controlling System Based on IoT

Ms. Mayuri Yende, Ms. Aishwarya S. Zade, Ms. Rutuja Ubhate, Ms. Diksha Deotare

Datta Meghe Institute of Engineering, Tech. & Research, Sawangi (Meghe).

Abstract: *A Greenhouse is a composition of different materials mainly consisting of transparent glass, cloth and shade through which air, sunlight and essentials required by plants to grow can be passed easily. Greenhouses are small areas where plants are planted and taken care in a controlled environment and monitored based on some factors so that there growth is faster and yields more. There are many methods used to keep track of growth of plants such as traditional, partially automated, etc. traditional is time consuming and requires human labour for keeping records of each plant. Similar goes with partially automated less time is required but human labour is same to keep watch on plants.*

This paper involves the brief idea of greenhouse monitoring and controlling system based on Internet of things (IoT).There are some factors to be monitored such as temperature, Humidity, Soil Moisture, light intensity,etc.These system have been built by two important parts i.e. Hardware and Software. The main aim is to design a efficient, low cost micro-controller based system to monitor and controlled the parameters and yield the optimum plant growth. The Microcontroller will send the information sensed by the sensors through Wi-Fi module wirelessly to the database and it will be displayed to the user on mobile application, so that they can controlled or accessed them anywhere and at anytime. With this system farmers or any person can control and monitor their greenhouse from their mobiles phones which have internet connection and can control actuators(cooling fan, water pump, light, etc) to adjust parameters by sending commands.

Keywords: *Internet Of Things(IoT), Wi-Fi module, Micro Controller, Sensors.*

I. Introduction

We live in country where everything can be controlled and monitored automatically but there are still few backward sector where automation has not been adopted because of several reasons such as cost, knowledge of internet and many more. One of such sector where automation is still a question is Agriculture. Agriculture is one of the primary occupations of man since early ages and even today farming is done in many parts of the country. Greenhouse is important part of Agriculture and Horticulture, as it can be used to grow plants and crops under controlled climatic conditions for optimum yields. Automating Greenhouse involves monitoring and controlling of climatic parameters which are responsible for the growth of plants or crops. Automation can be done through Iot(internet of things) thus by replacing humans by machinery. Now a days internet of things is only a theoretical concept but also practical in reality. Currently IoT works in such a way that machine communicates with machine and devices through embedded sensors.

Greenhouse in India is installed in high altitude regions where conditions for plant growth is favorable. The primary ways in which greenhouse is being practiced are:

1. Manual mode
2. Partially automated mode
3. Fully automated mode

1. MANUAL MODE: Manual mode involves visual inspection of the plant growth, irrigation of plants , spraying fertilizers and pesticides. This is done manually so time is consumed more as well as human labour required is also more.
2. PARTIALLY AUTOMATED MODE: Partially automated mode is combination of both manual as well as automated mode. It is similar to manual mode but only difference is that labour work is reduced.
3. FULLY AUTOMATED MODE: Fully automated mode is well implemented, so that it can give notification to climatic changes that occur in greenhouse and provide efficient results. Automated mode give chance to avoid and rectify human errors.

II. Architecture: Proposed Greenhouse System

This system gives the understanding of greenhouse monitoring and controlling system. This includes various sensors such as Temperature sensor and Humidity sensor (DHT11), Light Intensity sensor (LDR) and Soil Moisture Sensor, which will be connected to micro controller as input signals and the data will be saved in

microcontrollers temporary memory. The data saved will be transferred through Wi-Fi module (ESP12E) connected to microcontroller as well as to another Wi-Fi module connected to mobile application. The actuators will be controlled bothfrom microcontroller as well as mobile application, after certain conditions they will give signal and actuators will run automatically.

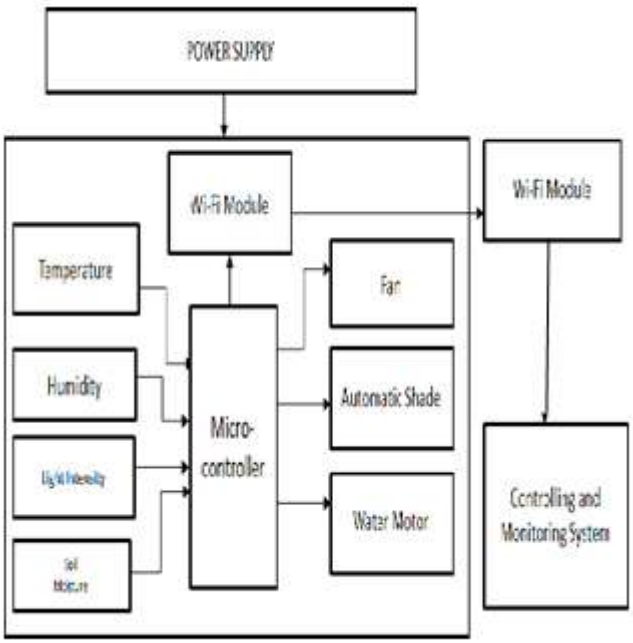

Fig. Architecture of system

III. Objective Of Proposed System

The objective of above system is to create a new concept and wide development for monitoring and controlling to improve the quality of measurements and analysis by using IoT. The system deals with monitoring and controlling environmental conditions like temperature, humidity and moisture with help of sensors and sends information to the application. The updated data from the system can be accessible on the internet from anywhere in the world. The system saves data in microcontroller which process the data and keep on transmitting it to the server over a Wi-Fi connection. This data is updated after few seconds so that it can be viewed through server. If conditions exceed certain values it can be controlled through server and actuators are plug on.

Hardware:

[1] Micro-controller:

Microcontroller contains bidirectional 40 pin DIP(Dual in-line package), out of which 33 pin are used. Since it is 40 pin, each side contains 20 pins.

[2] Temperature and Humidity Sensor

:DHT11

The DHT11 is a basic, ultra low-cost digital temperature and humidity sensor. It uses acapacitive humidity sensor and a thermistor to measure the surrounding air, and spits out a digital signal on the data pin (no analog input pins needed). It can measure relative humidity in percentage(20 to 90% RH).

[3] Light Sensor :LDR

The LDR are used to measure light intensity. LDR works on the principle of variable resistance, it changes its resistance according to light intensity. LDR is also known as photoconductor. Cadmium Sulphide (CdS) is used to make LDR. Cadmium Sulphide is deposited on an insulator in the shape of a zigzag line. The reason for zigzag path is to increase dark resistance and therefore decrease the dark current.

[4] Moisture Sensor:

A soil moisture sensor is used to measure the volumetric water content of soil. This soil moisture

sensor consists of two metal rods(probe) held apart at a fixed distance by some insulating material. Two metal rods pass current through the soil and resistance is measured. If the water is more, resistance is low and if the water is less, resistance is high. It also consists of a potentiometer to vary the sensitiveness of the sensor.

[5] Wi-Fi Module : ESP12E

ESP-12E Wi-Fi module is developed by Ai-thinker Team. core processor ESP8266 in smaller sizes of the module encapsulates Tensilica L106 integrates industry-leading ultra low power 32-bit MCU micro, with the 16-bit short mode, Clock speed support 80 MHz, 160 MHz.

Software:

[1] Android Studio:

Android Studio is the official integrated development environment (IDE) for Google's Android operating system, built on JetBrains' IntelliJ IDEA software and designed specifically for Android development. It is available for download on Windows, macOS and Linux based operating systems. It is a replacement for the Eclipse Android Development Tools (ADT) as primary IDE for native Android application development.

[2] Compiler:

A Compiler is a computer software that transform computer code written in one programming language into another. Compilers are not the only translator used to transform source programs. An interpreter is computer software that transforms and then executes the indicated operations. Before you can upload your program to your microcontroller, you need to compile it. This means converting the code from human-readable code to machine-readable code.

IV. Conclusions

To implement above system need to install the device in the greenhouse for collecting the data. By deploying the system in greenhouse we can make environment and system to interact with each other through network. Then the collected data will be available to the end user through the Wi-Fi. The collected data will be shared with other user for future use. A microcontroller based Greenhouse monitoring and controlling system is designed with sensors such as DHT11 sensor, soil moisture sensor, LDR sensor are the main sensor used in this project which gives the exact values of temperature ,humidity, soil moisture and light intensity respectively. The obtained values are transferred through Wi-Fi module and made available through server and can be controlled through app. This reduces the human labour required for manually switching actuators as well as reduces complexity. This project can be used in agricultural field , nursery and even in botanical garden.

Refernces

[1]. Rupali Satpute, Hemant Gaikwad, Shoaib Khan, Aaditya Inamdar, Deep Dave," IOT Based Greenhouse Monitoring System ", International Journal for Research in Applied Science & Engineering Technology (IJRASET),Volume 6, Issue 4, April 2018.

[2]. Vimal P V , Dr. K S Shivaprakasha ," IOT Based Greenhouse Environment Monitoring and Controlling System", IEEE Transactions on Instrumentation and Measurement,Vol. 63, No. 1 January 2017.

[3]. 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.

[4]. 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.

[5]. Remya Koshy, M D Yaseen, Fayis K, Nisil Shaji, Harish N J and Ajay M, "Greenhouse Monitoring and Control Based on IOT Using WSN", ITSI Transactions on Electrical and Electronics Engineering ,Vol. 4, Issue 3,2016.

[6]. Prakash. H. Patil, Chaitali Borse, Snehal Gaikwad and Shilpa Patil, "Greenhouse Monitoring System Using GSM", International Journal of Scientific & Engineering Research, 2013, Vol. 4, Issue 6.