International Journal For Technological Research In Engineering
Volume 7, Issue 12, August-2020 *ISSN (Online): 2347 - 4718*

SMART GREENHOUSE MONITORING SYSTEM USING IOT

Nisha B N[1], Nandini C[2], Pavithra D T[3], Rumana Anjum[4]
[1,2,3]B E IV Year, [4]Assistant Professor
Department of CSE, Vidya Vikas Institute Of Engineering and Technology
Mysuru, Karnataka, India

Abstract: Greenhouses are controlled area environment to grow plants. But to get the desired result some parameters like temperature, humidity, soil moisture, light intensity and soil Ph are important for plant growth.The greenhouse system separates the crop from the environment, thus it protects from the outside weather conditions. This enables the production of crops which otherwise could not be produced at that specific location. The greenhouse reduces the man work from crop environment. This greenhouse asset allows the farmer to improve the cultivation in a way the plants need. For continuous monitoring and controlling, we are using wireless sensor network. Here the greenhouse parameters are send through the internet to the open source cloud server. The parameters can be controlled by another web-server hosted locally. This project mainly focused on user friendly UI design and automatic system.Greenhouse area or environments monitoring different changes to parameters, the system for this purpose had been provided and given ability to control on climate of greenhouse.

Keywords: soil moisture, soil ph, UI design , light intensity

I. INTRODUCTION

Internet of things (IOT) can be expressed as the architecture of physical things implanted with electronic circuits, sensors and programming along with an associative system these things to trade information from each other. The greenhouse manufacturing is the quickest developing part of the world. Greenhouse farming is a method of providing favourable environmental conditions to plants by growing them under a farmed structure covered with a transparent material. Greenhouse is a best option to enhance the performance. Hand-operated greenhouse has drawbacks like visual inspection of plant growth, turning on and off the temperature controllers. Greenhouse monitoring on IOT is time consuming, vulnerable to human error and less accurate and unreliable. So fully automized greenhouse may be best. The humidity and temperature of air in a greenhouse are, measured by sensor and whenever temperature is high or air moisture becomes too low, fogger is turned on to provide the necessity of moisture and cool down the temperature.By using the manual system, a lot of problem can occur not for worker but also affected production system.

1.1 Objectives

- Ease of accessing and simplicity on maintenance
- Advanced connectivity of physical objects over a wide network.
- To maintain the history of parameter records
- Build miniature greenhouse which is equipped with automatic monitoring and controlling system.
- It focuses on saving water, increasing efficiency and reducing the environmental impacts on plants production.
- The user can see the atmospheric conditions of the greenhouse plants on website and control the greenhouse from faraway places.

II. PROPOSED SYSTEM

This project describes the design of a greenhouse monitoring and controlling system based on Iot. Some of the systems used android phone to monitor the greenhouse but lacked to control it using android from remote locations. The biggest disadvantage of this system was that one person always had to be present in the greenhouse or in the vicinity of the greenhouse. The first problem which we overcome in our system is that a person need not always be present in the greenhouse. Our system will allow to take proper decisions by providing the status of the sensors to the farmer with accurate information through the iot web server. Thus this system helps farmer to control greenhouse from remote locations.

III. SYSTEM DESIGN

In client side data logger interface has been designed a Windows application to display data of sensors and transceiver the data to/from web server. The system monitoring designed to monitor different real-time data transmitted via interfaced electronic circuit deigned to get data of various sensors. The system monitoring design in client side has been designed using Microsoft Visual Studio 2012. The controller was required to monitor the temperature, humidity, light and soil moisture levels as these are some important environmental factors during plant growth. The design had been aimed for this was to think about what can be done to control these factors. It is also necessary to think about how the web application would interact with the sketch so that it could display the current sensor values.

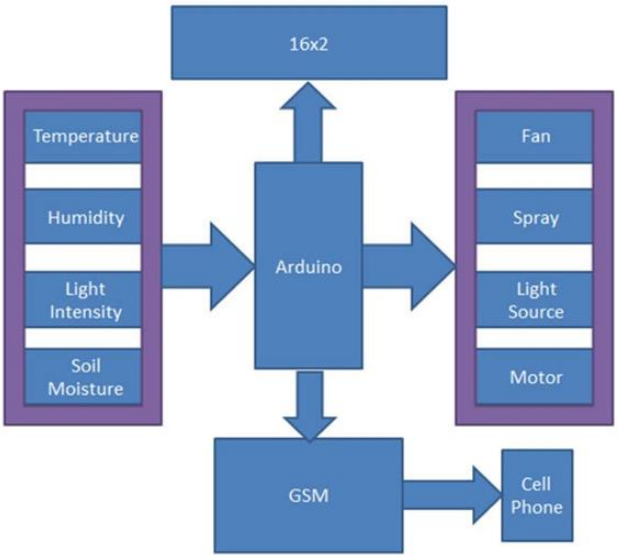

Fig 1 System Architecture of Greenhouse

This sensors sense the change and the micro controller reads this from the data at its input ports after being converted to a digital form by the ADC of micro controller. The micro controller then performs its needed actions by employing relays until the strayed -out parameter has been brought back to its optimum level. Since a micro controller is used as the heart of the system, it makes the set-up low-cost and effective nevertheless. This system consists of various sensors, namely soil moisture, humidity, temperature and light. These sensors sense various parameters- temperature, humidity, soil moisture and light intensity and are then sent to the micro controller. In this project we use many sensors. Out of these sensor's one sensor is temperature sensor.

3.2 Flow Chart

The control loop of the system is dependent of the five states earlier discussed and follows the flow chart. The program starts without being in a state but after the first run a state has been entered. At first process the temperature is read and depending of its value a state is entered and an action of the fan and heater are actuated. The loop that saves the previous state so if a grey area is entered the correct action can operate. In the end of the loop the soil moisture value or data is read and if the value is below the measured limit or set value the pump will be operated. The first time state one or two is entered the loop is delayed for three and a half minute to let the power resistor to heat up before the fan is tuned on for 15 seconds. If the state two is entered from state one or two the delay is set to 45 seconds and if state one is entered the delay is set to one minute. State one has a longer delay than state two because the fan is set to full speed which will be further cool down the power resistor. The temperature is read every 15 seconds and an action will operate during those 15 seconds.

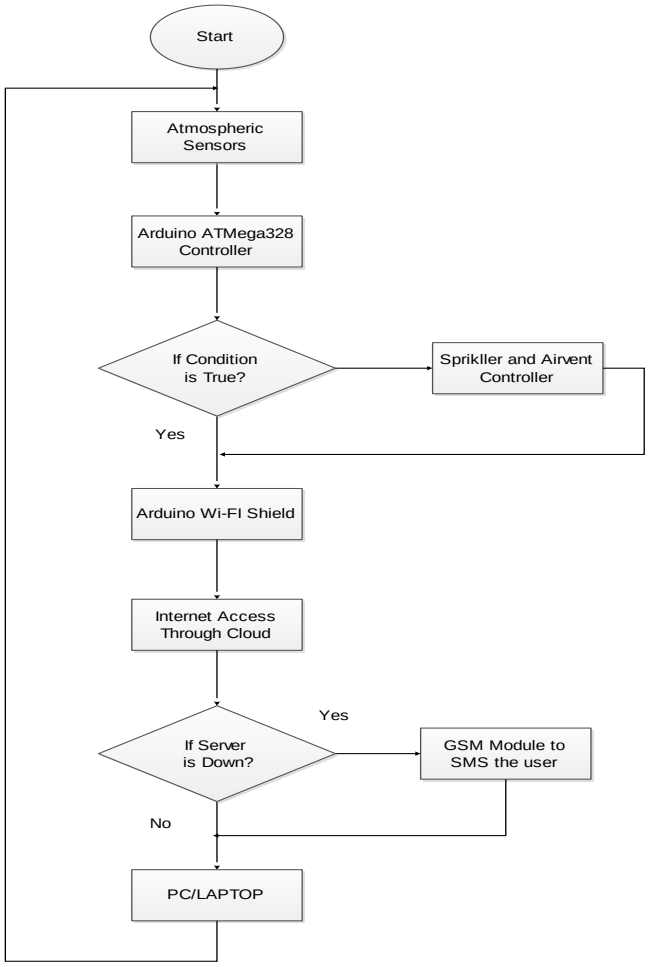

Fig 2 Flow chart of Greenhouse monitoring

IV. IMPLEMENTATION

Humidity Sensors

- Here Humidity Sensors are basically used for measuring the relative humidity inside the greenhouse, which is the measure of vapour air to the total amount of vapour that could be held in the air for a given temperature.

Temperature Sensors

- As the name suggests, these are used for monitoring the temperature and used to check whether the temperature is either high or low inside the green house. And a critical value of temperature is fixed.
- And when the temperature inside the greenhouse reaches above the critical temperature level, the coolant is provided to cool down the temperature and bring it down to the favorable required temperature inside the green house.

Light sensors

-LDR(Light Dependent Resistor) is the light sensor which is usually used for the purpose. Its main function is to monitor the intensity of light.

- It turns off the light when it need to save the power and turns on the light when light is required in the greenhouse.

Fire Sensor

-A fire detector would works by detecting smoke and/or heat. These devices respond to the presence of smoke or extremely

high temperatures that are present with in a fire.
-After the device has been activated, it will send a signal to the alarm system to perform the programmed response for that zone or area.
Arduino

-The arduino isa open source microcontroller based kit for building digital devices and interactive objects that can sense and control objects in the physical world.
-Arduino provide sets of digital and analog I/O pins that can be interfaced to various expansion boards and other circuits.
-For programming the microcontroller, the arduino has specific software associated with it which provides an integrated development environment (IDE) which includes support for the C and C++ programming languages.
IR flame sensor module

-A model that consist of flame sensor, resistor, capacitor, potentiometer and comparator LM393 in a integrated circuit.
-Working voltage is between 3.3V and 5.2V DC with digital output to indicate the presence of a signal. Sensing is conditioned by a comparator.
Soil moisture sensor
-This Soil Moisture Sensor that uses the capacitance to measure the dielectric permittivity of the surrounding medium and the moisture level of greenhouse. In soil, dielectric permittivity is a function of the water content The sensor averages the water content over the entire length of the sensor.
Node Mcu
It is an open-source firmware and development kit that helps you to prototype or build IOT product. This includes firmware which runs on the ESP8266 Wi-Fi SoC from EspressifySystems, and hardware which is based on the ESP-12 module. The firmware uses the Lua scripting language.

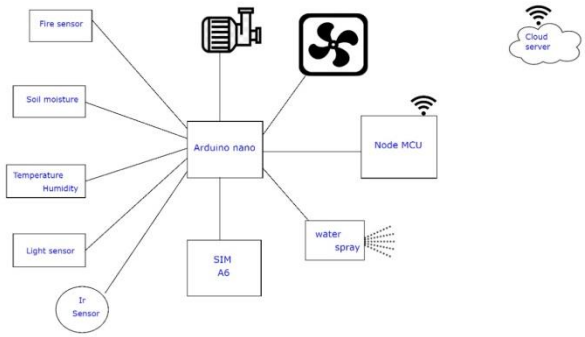

Fig 3: Implementation Design

V. CONCLUSION

The proposed IOT based greenhouse monitoring system is a complete system that is designed to monitor and control the environmental parameters inside a green house. The traditional system for greenhouse monitoring is very labour-intensive and also time consuming. The proposed system saves time, money and human effort. It also provides a controlled environment for the plants to prevent them from damage and thus increasing the overall produce. The smart greenhouse automatically controls the various parameters needed for the plants and sends the sensory data to a customized web page for continuous and effective monitoring.

VI. FUTURE ENHANCMENT

In future by building up a versatile application for IoT framework makes more adaptable to the people groups. The proposed system consists of two WIFI modules, as a future implementation we will implement a common server for recording the parameters and controlling the system. The other necessary updating is the implementation of chemical sensor. Chemical sensors can be used to measure the PH and chemical components in soil.

REFERENCES

[1] Data acquisition of greenhouse using Arduino-journal babylon university /pure and applied science.
[2] Arduino based automatic plant watering system-devika Et AI, international journal based research in computer science and software engineering.
[3] http://www.arduino.cc
[4] Prof. D.O. Shrinath, Punamkamble, Rohini Mane, Ashwini kopla, Prof. R.S. More “IOT Based Smart Greenhouse Automation using Arduino”. International Journal of Innovative Research in computer science and Technology(IJIRCST), Volume-5, Issue-2, March 2017.
[5] Mohammad Woli Ullah, Mohammad Golam Mortuza, Md Humayan Kabir, Zia Uddin Ahmed, Sovan Kumar Dey Supta, Partho Das, “Internet of Things Based Smart Greenhouse: Remote

Monitoring and Automatic Control", International Conference on Electric and Intelligent Vehicles(ICEIV 2018).

[6] Somnath D. Bhagwat, Akash I.Hulloli, Suraj B.Patil,Abulkalam.A.Khan,Mr.A.S.Kamble,"SMART GREENHOUSE USING IOT AND CLOUD COMPUTING", International Research Journal of Engineering and Technology, Volume 5,issue 3,March 2018.

