International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 08 Issue: 01 | Jan 2021 www.irjet.net p-ISSN: 2395-0072

IoT based Green House Monitoring System using Raspberry Pi

Mr.B.L.Kulkarni[1], Prerana Godse[2], Payal Gavhane[3], Rutuja Adamane[4], Simran Nile[5]

[1]Prof. Dept. of Electronics and Telecommunication Engineering, Amrutvahini Polytechnic, Sangamner, India
[2,3,4,5]Students, Dept. of Electronics and Telecommunication Engineering, Amrutvahini Polytechnic, Sangamner, India

---

Abstract *- A greenhouse provides an environment to grow plants all year round, even on cold and cloudy days. However, extreme environmental factors inside the greenhouse such as high temperatures and a high humidity can negatively impact the plants. Consequently, controlling this environment is essential in order for the plants to grow strong and healthy. The aim of this project is to design and build a greenhouse controller that can maintain the environment, by acting upon live sensor readings and be able to display the status of the system to the owner. The project was split into two parts: programming a raspberry PI3 using Python language to act as the central hub that manages the various sensors such as LM35 Temperature, soil moisture, Water Level and LDR as transducers; and creating a web site to allow the user to interact with the greenhouse controller. This work showcases a Web-Based climatic condition monitoring all the parameters that are required to grow plants.*

Key Words: **Raspberry Pi, IOT webpage, green house monitoring, Temp sensor, soil moisture sensor, Water Level Sensor, LDR.**

1. INTRODUCTION

Monitoring is employed in various applications including temperature, humidity, soil moisture, light. The Web-Based Climatic condition monitoring system that can be access anywhere and anytime through the internet is build. With this system user can remotely monitor the greenhouse climatic conditions from anywhere which could save the human expenses. Web-Based climatic condition monitoring is one type of recorder that monitors a temperature, Water level, moisture and light in a greenhouse room and stores the data into a database and display the current temperature on the website through a web server. The system will continuously monitor the temperature, soil moisture and light condition of the environment and the data can be monitored at anytime and anywhere from the internet. Proposed design is, this system consist of various sensors, namely soil moisture, temperature, water level and light sensors. These sensors sense various parameters and are then sent to the Raspberry pi. After studying this, the program has been written on to the raspberry pi for specific environment conditioning. The desired temperature and humidity are maintained by turning on heater/cooler. The moisture level within soil is also be controlled by turning the water valve on/off. Desired light intensity for that environment can also be controlled by emergency lights when necessary. Hence the greenhouse environment is controlled automatically. The purpose of this project was therefore to make it easier to grow food at home. This can be achieved with the use of an automated greenhouse. A greenhouse makes it possible to replicate a different climate and consequently grow food that would not typically grow in the area. Additionally, making the greenhouse automated enables people to grow their own food or plants at home without having to constantly look after them. It can be reassuring to know that the plants are taken care of while one is on vacation or not around the house for a longer period of time. The research question of this study was to analyze if it is possible to maintain the greenhouse temperature in a desired range for optimal plant growth using a temperature control system. Another objective was to investigate if the watering system is reliable, that is whether or not is can obtain a perfect soil moisture level for the chosen plant.

1.2. LITERATURE REVIEW

[1]Vimal P V and K S Shivprakasha proposed IOT based Greenhouse environment monitoring and controlling system using Arduino platform. They have used GSM (Global system for mobile communication) modem to send SMS (short message service) which display present status of the environmental parameters and Ethernet. The Arduino Ethernet shield allows Arduino board to connect to the internet. The GSM sends SMS to the user when sensor value exceeds a defined level. The user turn on the actuator by sending another SMS. All environmental parameter are sending to server through Ethernet and stored in the database.

[2]Ravi Kishore Kodali, Vishal Jain and Sumit Karagwal suggested IOT based smart greenhouse system for improvement in farming. They have used microcontroller for controlling the output of various sensors. Fogger have used which will sprinkled tiny water droplets of size micron which will remain suspended in the air and bring the temperature down. Underground tank is made for storing the water and that is used for plants through drip irrigation. The storage house would be there for storing fruits or vegetables and farmer will swipe RFID tag and the data from all containers will be updated on Google spread sheet and e-mail will be sent to an e-commerce website to save farmer from middleman.

[3]Sandip Khot, Dr. M. S. Gaikwad proposed Green House Parameters Monitoring System. They have used raspberry pi,

Wi-Fi, web server in their system. Light intensity based most of the devices can be controlled. Most of the time to differentiate between day and night time, measuring light form sunlight is essential. Where, light measurement and analysis is an important step in ensuring efficiency and safety.

[4]Kiran Ganesan, Uzma Walele suggested Raspberry-Pi Based Automated Greenhouse A greenhouse provides an environment to grow plants all year round, even on cold and cloudydays. However, extreme environmental factors inside the greenhouse such as high temperatures and a high humidity can negatively impact the plants. Consequently, controlling this environment is essential in order for the plants to grow strong and healthy. The aim of this project is to design and build a greenhouse controller that can maintain the environment, by acting upon live sensor readings and be able to display the status of the system to the owner.

[5]Prerana Chaudhari1,Aparna Kamble2 suggested Crop Monitoring System using Raspberry Pi Today in green house people have to look at each and every crop which is planted in green house and if any changes in the environment takes place that will damage that crop this people will come to know when they will see that crop. Crop Monitoring System is a light intensity based used to control the devices and monitor the crops

2. PROPOSED SYSTEM

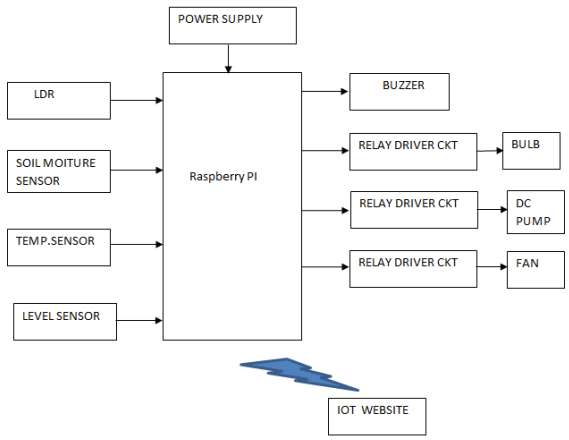

Fig 1: Block Diagram of System

In this, we present the theory on IOT based green House Monitoring. The overall block diagram of the proposed method is explained. Each and every block of the system is explained in detail. In this proposed block diagram consist of several sensors (water level, Soil Moisture sensor, temp sensor, LDR) is connected to Raspberry Pi controller. The controller is accessing the sensor values processing them and control Fan, Bulb, Pump.

A. Raspberry-PI 3:

The Raspberry Pi 3 Show B is the most recent form of the Raspberry Pi, a minor credit card estimate computer. Fair include a console, mouse, show, control supply, smaller scale SD card with introduced Linux Dispersion and you'll have a fully-fledged computer that can run applications from word processors and spreadsheets to diversions. As the Raspberry Pi3 bolsters HD video, you can indeed make a media middle with it. The Raspberry Pi 3 Show B is the to begin with Raspberry Pi to be open-source from the get-go, anticipate it to be the defector inserted Linux board in all the gatherings. [7] Technical Specification of raspberry pi: 1. Broadcom BCM2837 64bit ARMv7 Quad Center Processor powered single board machine running in 1. 2GHz. 2. 1GB RAM BCM43143. 3. Wi-Fi on board.4. Bluetooth Low Energy (BLE) on board.5. 40pin extended GPIO, 4 x USB 2

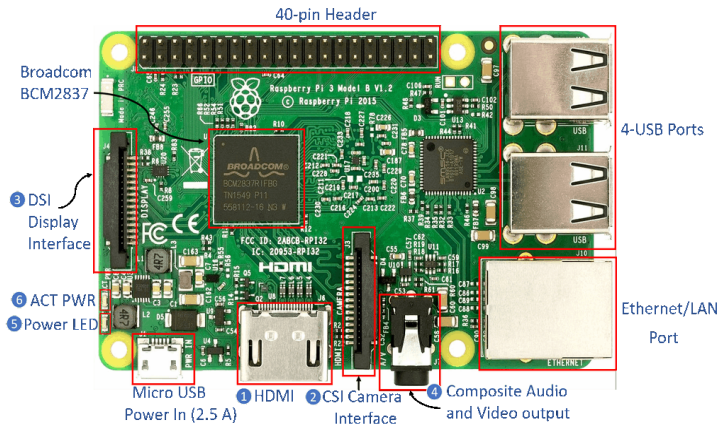

Fig -2: Raspberry-PI 3

B. Soil Moisture sensor:

This sensor measures the volumetric content of water inside the soil and gives us the moisture level as output. The sensor is equipped with both analog and digital output, so it can be used in both analog and digital mode. In this article, we are going to interface the sensor in both modes. So let's begin our tutorial on interfacing Arduino and Soil moisture sensor.

The soil moisture sensor consists of two probes which are used to measure the volumetric content of water. The two probes allow the current to pass through the soil and then it gets the resistance value to measure the moisture value.

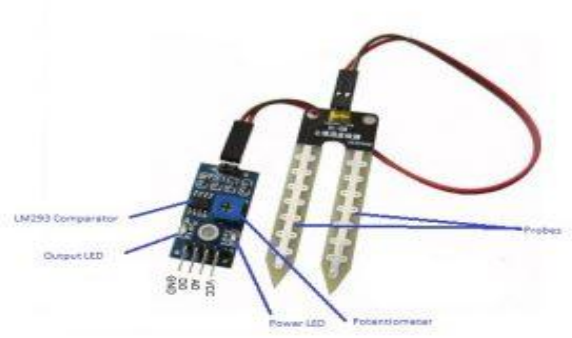

Fig -3: Soil Moisture Sensor

C. Water Level Sensor:

Level sensors are used to detect the level of substances that can flow. Such substances include liquids, slurries, granular material and powders. Level measurements can be done inside containers or it can be the level of a river or lake.

Fig -4: Water Level Sensor

D. LM35 Temperature Sensor:

The LM35 series are precision integrated-circuit temperature sensors, whose output voltage is linearly proportional to the Celsius (Centigrade) temperature. The LM35 thus has an advantage over linear temperature sensors calibrated in ° Kelvin, as the user is not required to subtract a large constant voltage from its output to obtain convenient Centigrade scaling. The LM35 does not require any external calibration or trimming to provide typical accuracies of ±¼°C at room temperature and ±¾°C over a full -55 to +150°C temperature range. Low cost is assured by trimming and calibration at the wafer level. The LM35's low output impedance, linear output, and precise inherent calibration make interfacing to readout or control circuitry especially easy. It can be used with single power supplies, or with plus and minus supplies. As it draws only 60 µA from its supply, it has very low self-heating, less than 0.1°C in still air. The LM35D is rated to operate over a 0° to +100°C temperature range.

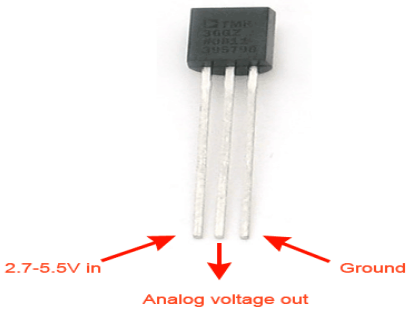

Fig -5: LM35 TEMP Sensor

E. Relay unit:

Relays are switches that open and close circuits electromechanically or electronically. Relays control one electrical circuit by opening and closing contacts in another circuit. As relay diagrams show, when a relay contact is normally open (NO), there is an open contact when the relay is not energized. When a relay contact is Normally Closed (NC), there is a closed contact when the relay is not energized. In either case, applying electrical current to the contacts will change their state.

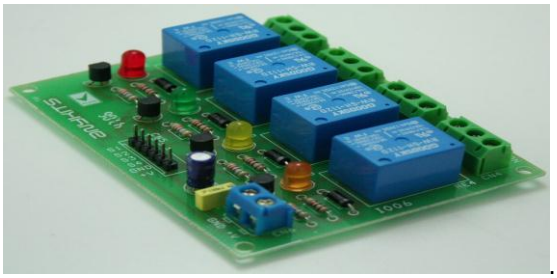

Fig -6 Relay Unit

F. LIGHT DEPENDENT RESISTOR (LDR):

The Light Subordinate Resistor (LDR) is fair another extraordinary sort of Resistor and subsequently has no extremity. Meaning they can be associated in any course. They are breadboard inviting and can be effortlessly utilized on a perf board too. The image for LDR is fair as comparable to Resistor but includes to internal bolts as appeared underneath. The bolts demonstrate the light signals. It can be utilized to sense Light, it is a little, cheap and effectively accessible, Accessible in PG5, PG5-MP, PG12, PG12-MP, PG20 and PG20-MParrangement. When light falls on the LDR then the resistance decreases, and increases in the dark. When a LDR is kept in the dark place, its resistance is high and, when the LDR is kept in the light its resistance will decrease.

Fig -7 LDR

3. CONCLUSIONS & FUTURE SCOPE:

The system allows monitoring the condition of greenhouse, which is collected using various sensors and send the data to Raspberry-Pi and accordingly necessary action are taken. There were four objectives set at the start of the project:

1. Take Temperature, water level, Light and Soil Moisture readings.

2. Display past and present sensor readings to the user.

3. be able to update the settings for multiple plants.

4. Act upon sensor readings that deviate from the defined range.

All the above objectives have been achieved /met and the automated greenhouse gives flourished plants.

In coming future food becomes a valuable resource due to changes in climate. Global warming has become a great thread to many spices end. Responsibility for future generations are needed to be taken by developing agriculture practices independent of climatic conditions. More intelligent machines are needed for the observation of greenhouse and for taking their own decision like humans.

REFERENCES

[1]Kodali, Ravi Kishore, Vmal Jain, & Karagwal, Sagar: "IOT based smart greenhouse," 2016 IEEE Region 10 Humanitarian Technology Conference (R10-HTC).

[2]Vimal, P. V., & Shivaprakasha, K. S.: "IOT based greenhouse environment monitoring and controlling system using Arduinoplatform," 2017 International Conference on Intelligent Computing, Instrumentation and Control Technologies (ICICICT).

[3]Prerna Chaudhari , Aparna Kamble, Snehal More, Namrata Sawant, Archana Chaugule : "Crop Monitoring System using Raspberry-Pi," International Journal of advance Reasearch in science and engineering volume no.06, Issue no. 10, oct 2017.

[4]Sandip Khot, Dr. M. S. Gaikwad : " Green House Parameters Monitoring System using Raspberry Pi and Web Server," International Journal Of Innovative reasearch in science, engineering and technology Vol. 5, Issue 5, May 2016 .

[5]Shetal Vatari, Aarti Bakshi, Tanvi Thakur: "Green House by using IOT and cloud computing," IEEE Advancing Technology for Humanity.

[6]Kiran Ganesan, Uzma Walele, Namrata Hambire, PIyush Chaugule, Dipthi Oommen: "Raspberry pi based automated greenhouse," International Reasearch Journal Of Engineering and technology volume: 05 issue: 03, march 2018.

[7]Keerthi. V., Dr. G. N. Kodandaramaiah: "Cloud IOT based greenhouse monitoring system," International Journal of Engineering Research and applications, ISSN:2248-9622, vol.5, issue 10, oct 2015 .