May-June 2020
ISSN: 0193-4120 Page No. 4441-4445

IoT based Plant Monitoring System Using BLYNK App

[1]Suhani Jain, [2]Srilatha M. N, [3]Soumyashree D. S, [4]Swati S. Mathpati, [5]Kiran M

[1,2,3,4,5]School of Computing and Information Technology, REVA University, Bengaluru, India
[1]r17cs414@cit.reva.edu.in, [2]r17cs409@cit.reva.edu.in, [3]r17cs406@cit.reva.edu.in,
[4]r17cs420@cit.reva.edu.in, [5]kiranm@reva.edu.in

Article Info
Volume 83
Page Number: 4441-4445
Publication Issue:
May - June 2020

Article History
Article Received: *19 November 2019*
Revised: *27 January 2020*
Accepted: *24 February 2020*
Publication: *12 May 2020*

Abstract
This paper outlines state-of-the-art solution for plant monitoring system. The approach towards the solution, uses the concept of Internet of Things (IoT) and BLYNK application which helps us to monitor the plant effectively, so that we can make sure that the plant is taken care of and watered properly when required. In this paper, the implementation approach is designed in an effective manner to send us a notification when the moisture content in the soil of the plant is less and needs watering. Also, provides the details of temperature, humidity, light level, and air pressure.

Keywords**:** *Internet of Things (IoT); Chirp; Wemos LOLIN32 Lite; BME280 Sensor; Arduino IDE; ThingSpeak API;BLYNK App*

1. Introduction

Plants take up a very important role in the environment. They are the source of oxygen and food which are very important to the animal world. They also play an important role in bringing down the pollution prevalent in this modern world. It is therefore very important that all of us grow plants and ensure they are healthy. We have to take care to water them regularly and monitor them so that they grow efficiently.

Modern world is a busy world. Everyone is hustling and working hard. People tend to forget to water the plants and care for it. This results in the plants becoming weak and eventually leads to their death.

So, this paper ensures the healthy growth of the plants by monitoring them regularly and sending the information about the temperature, humidity, etc. to our smart phones. It also makes certain that the plant is watered regularly by sending an alert signal which reminds us that the plants needs watering.

This way, the chances of the plants not being watered are drastically reduced. This state-of-the-art solution can be used in the agricultural sector as well where the farmers can be informed about the temperature, humidity, light level and air pressure around the crops and make effective decisions based on these parameters. This will help to get an optimum produce since they are cultivated in a controlled environment.

2. Literature Survey

In the paper, Kawale Jayashri et. al.[1], a plant is controlled by governing the climatic parameters directly or indirectly, hence monitors the plants growth and their produce.

In the paper, Vimal P. V. et. al. [2], IoT is allowing to control the plant system from remote area over internet. It can control the sensors which are used to monitor the health of the plant. Since, the implementation is automatic we can reduce human errors.

In the paper, Judika Herianto Gulttom et. al. [3], overheated greenhouse gas makes the soil very dry and hence it uses more water for its growth. Plant monitoring system alerts users against harmful conditions.

In the paper, Vaishali S. et. al. [4], automatic water sprinkle and monitoring system help to automatically water and monitor the plants which becomes a growth factor for urban farming. This growth will be monitored in real time and the people of the urban society need not worry about the physical maintenance of their plants and can monitor this using their smartphones.

In the paper, Sherjeel Khan et. al. [5], the system continuously monitors the parameters such as temperature, humidity, and moisture content of the soil. The algorithm used here contained threshold values of soil moisture to be maintained.

May-June 2020
ISSN: 0193-4120 Page No. 4441-4445

In the paper, Varalakshmi P. et. al. [6], the quality of the plant is based on the photosynthesis process including light and temperature levels. Sensors are used to detect slight changes in the weather around the plant.

In the paper, R. Nageswara Rao et. al. [7], the aim is to achieve maximum lifespan of the plant. If there is any problem with the plant, then the care takers get an alert notification.

In the paper, A. Pravin et. al. [8], the aim is to collect the information from the field based on the water quantity, temperature, LDR sensors data. But they also mentioned on an automatic pump which will take up a large memory in order to indicate for water to be supplied automatically.

In the paper, Hemant Kuruva et. al. [9], the data collected is for remotely based plants and to monitor their growth. This system can be used and controlled remotely. It cannot be used other than the remote plants.

In the paper, Sai Sreekar Siddula et. al. [10], a new system for water monitoring and management should be established which can provide water level in real time, One of the easiest way to measure water level is using water-proof sensors which are easily installable and requires very less maintenance.

3. System Design and Analysis

As shown in the figure 1, the 3 devices are connected to perform the task. The Chirp plant watering alarm andBME280 sensor are connected to Wemos LOLIN32 Lite(ESP32 Wi-Fimodule).This setup is then attached to the plant and test will be carried out to generate real time data. The BLYNK App provides a platform where the user can analyze the data and take necessary steps to keep its plant healthy.

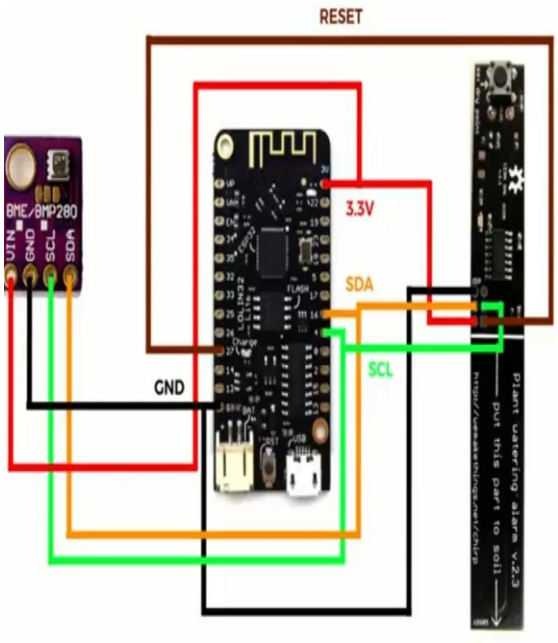

Figure 1: Pin Diagram of State-of-the-Art Model

4. System Requirements

A. Chirp Plant Watering Alarm

Figure 2: Chirp Plant Watering Alarm

B. Wemos LOLIN32 Lite

Figure 3: Wemos LOLIN32 Lite

C. BME280 Sensor

Figure 4: BME280 Sensor

D. USB Cable

Figure 5: USB Cable

E. Breadboard

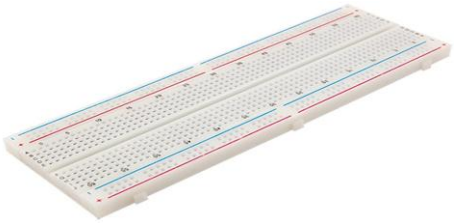

Figure 6: Breadboard

F. Jumper wires

Figure 7: Jumper Wires

G. Arduino IDE

Figure 8: Arduino IDE

H. BLYNK App

Figure 9: BLYNK App

I. ThingSpeak API

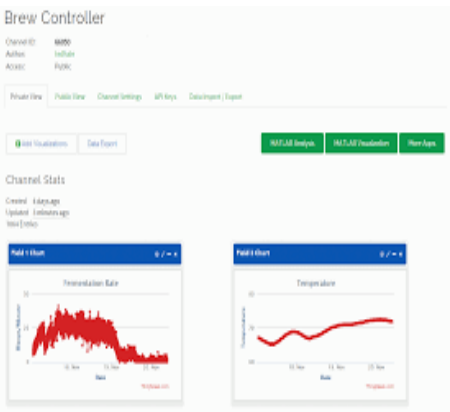

Figure 10: ThingSpeak API

5. Methodology

Once the plant is setup, the data will be sent to user of the plant via ESP32 Wi-Fi module. The data collected is stored based on the user requirements, helps in determining the health of the plant. The sensor is programmed for certain values to which the plant is adaptive. For instance, if the moisture content goes less in the soil then the device called Chirp makes an alarming sound to alert the user and then the user will switch on the water pump through the App. Once the required water is supplied, the user will switch off the water pump in the same way.

Here we are considering the Fern plant. The different parameters used to monitor the health of this plant are soil moisture content, temperature and humidity of the surroundings and light intensity around the plant. Average temperature of the Fern plant is 65-75°F.If the temperature degree exceeds 75°F,then we have to water the plant and if the degree goes below 60°Fthen water need to be supplied only when the soil of the plant is dry to touch. Fern plant home required humidity is 5%-10% relatively. The BME280 sensor used here measures humidity, pressure, and temperature around the plant. The Chirp is used to measure moisture content in soil and also the light around the plant. By this data, the user can get to know if the plant is placed appropriately or not.

Using 3 devices namely Chirp, BME280 sensor and Wemos LOLIN32 Lite, the data is collected from the plant. These readings are sent to the cloud using ThingSpeak API at regular intervals of time (60 minutes). The cloud is then used to connect to BLYNKApp to the BLYNKServer to operate the real time data.

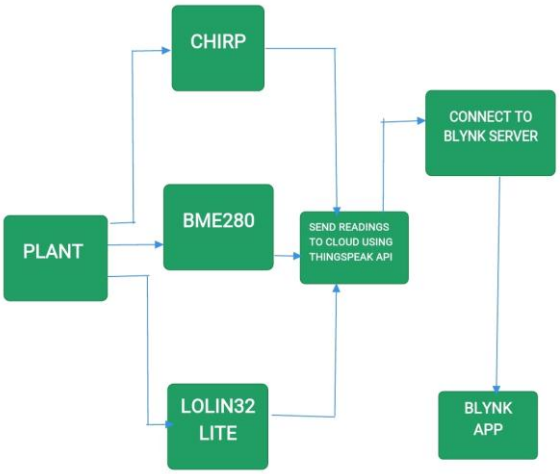

Figure 11: Flow Diagram of State-of-the-art Model

6. Experimental Results

The state-of-the-art proposed system was successfully tested with respect to different parameters for monitoring the plant at different conditions. The data collected and analyzed using ThingSpeak API is displayed in BLYNK App as shown below.

May-June 2020
ISSN: 0193-4120 Page No. 4441-4445

Figure 12: Graphs displayed for overall health of the plant - Humidity,Light Level and Air Pressure.

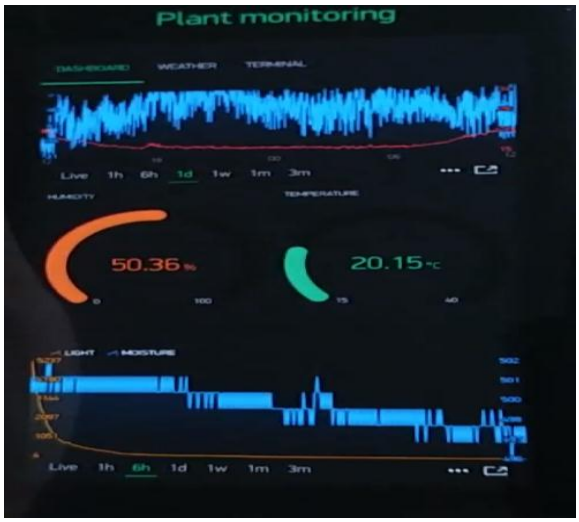

Figure 13: Graphical representation of data obtained from the plant inBLYNK App.

7. Conclusion and Future Enhancement

In the present world, people are very busy in their lives and this keeps them from developing any kind of hobbies. This makes their life plain, boring and lifeless. Hence, we came up with this state-of-the-art approach of developing a plant monitoring system which is economic and affordable to common people. It not only gives people an opportunity cultivate a new hobby but will also contribute to the nature. This can also be used to increase the production of the yield if used in agricultural field and leads to the decrease of loss of yield. It is also very beneficial for personal use as it helps to monitor the health of the plant and also reminds us to water it regularly. Many commercial and medicinal plants can be grown at home and taken good care of through this model. The maintenance of this system is cost effective as it consumes less power and is simple to use. It is also easy for a layman to understand and can thus help contribute to a healthy and flourishing plant with less effort and thought as it is solely based on the data collected ans processed through the sensors.

The future implementation and extension of this state-of-the-art model can go step further to implement automatic watering system to the plants, to add camera to get live updates and see the plant from any location and providing ID to each plant for getting individual updates based on entering the ID of the respective plant in BLYNK App.

References

[1] Asst. Prof. Kawale Jayashri,Sanjay More, Akshay Bankar, Ganesh Dongre, Pooja Patil, "IOT BASED SMART PLANT MONITORING SYSTEM", International Journal of Advance Research in Science and Engineering,vol.7,2018,pp. 409-413.

[2] Vimal P V, Dr. K SShivaprakasha, "IOT Based Greenhouse Environment Monitoringand Controlling System using Arduino Platform", 2017 International Conference on Intelligent Computing,Instrumentation and Control Technologies (ICICICT),vol.3,2017,pp. 1514-1519.

[3] Judika Herianto Gultom, Maruf Harsono, Handri Santoso, Tubagus Dhika Khameswara, "Smart IoT Water Sprinkle and Monitoring System for Chili Plant", International Conference on Electrical Engineering and Computer Science (ICECOS) 2017,vol.5,2017,pp. 212-216.

[4] Vaishali S,Suraj S,Vignesh G,DhivyaS andUdhayakumar S, "Mobile Integrated Smart Irrigation Management and Monitoring System Using IOT",vol.9, 2017,pp.2164-2167.

[5] Sherjeel Khan, Muhammad Mustafa Hussain, "IoT enabled Plant Sensing Systems for Small and Large Scale Automated Horticultural Monitoring",2019,pp.303-308.

[6] Varalakshmi P, Sivashakthivadhani B Y, Sakthiram B L, "Automatic Plant Escalation Monitoring System Using IoT", 3rd International Conference on Computing and Communication Technologies (ICCCT 2019),2019,pp.212-216.

[7] R. Nageswara Rao, B.Sridhar "IOT BASED SMART CROP-FIELD MONITORING AND AUTOMATION IRRIGATION SYSTEM" Proceedings of the Second International

May-June 2020
ISSN: 0193-4120 Page No. 4441-4445

Conference on Inventive Systems and Control (ICISC 2018), vol. 6,2018,pp. 478-483.

[8] A.Pravin, T. Prem Jacob and P.Asha, "Enhancement Of Plant Monitoring Using IoT", International Journel of Engineering and Technology, vol. 7, 2018, pp. 53-55.

[9] Hemant Kuruva, Balumuri Sravani, "REMOTE PLANT WATERING AND MONITORING SYSTEM BASED ON IoT", International Journal For Technological Research In Engineering, Volume 4, Issue 4, December 2016, pp. 668-671.

[10] Sai Sreekar Siddula, Phaneendra Babu, P.C.Jain,"Water Level Monitoring and Management of Dams using IoT", 2018 3rd International Conference On Internet of Things: Smart Innovation and Usages (IoT-SIU), 2018.