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Advanced Plant Monitoring System using IOT

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Abstract

In IoT plant monitoring system we can monitor and control with the help of IoT concepts. The gasses produced by the plant in Day time and nighttime will be monitored on IoT cloud. And according to the moisture of the soil the water pump supply to the plant will be controlled. If moisture is seen below the certain threshold value, then the pump will get turned on and when moisture reaches above the threshold level then the water pump will be turned off by the controller in the system. The Temperature and humidity will be sensed by smart sensors digitally. The hazardous gas will be sensed by the other sensor at that place. The controller which is integrated in the different gasses data on IoT Cloud with the help of Wi-Fi and IoT system. Other circuitry is used to control the relay and to provide power supply to the system.

Keywords: IoT, Moisture, Temperature, Humidity, Relay.

I. INTRODUCTION

A system to monitor temperature, humidity, CO2, Nitrogen and other Gasses levels of moisture in the soil has used. Agriculture is one of the important occupations in India. Also, the main element required for agriculture is water. This project will be used to monitor and analyse the water requirement for the plant by switching the designed motor on and off which will basically depend on the atmospheric conditions around the plants. In this generation people prefer to grow the plants at the backyards or in the available open space nearby and thus this will surely help them in growing plants in small scale farming to provide the best out of the output. Doing this specific activity will result in proper and efficient use of water in small scale farming process. As in India there is the scarcity of water in many of the regions the proper use of water is must, otherwise there can be damage in the plants or the soil. Using this the small-scale farmer can easily handle the crop situation taking the climate into consideration

II. LITREATURE SURVEY

Let's take various previous papers into consideration by various different researchers. Agriculture has the need to reduce the manpower and increase the production. Using different controllers research was made on Monitoring greenhouse and the control system by Morawiecki et al [1], here it is seen that wireless sensor network has been designed by the nodes that are wireless inside the greenhouse having certain sensors of temperature, gas, etc. the control over these factors was necessary and thus the microcontroller was programmed as per the needs. Prof. Prachi Kamble [2] Taking this information in account we have used the DHT11 sensor module to detect the information regarding temperature. A ZigBee based project was made by K. Lokesh Krishna et al [3], which was basically used to control and handle the system which

was further designed using the processor ARM 7. the sensors for different uses were also installed with the communication panel. This all was done to reduce the man power required for all the agriculture purpose. Using the PIC microcontroller the greenhouse monitoring system was made by S. Arul Jai Singh et al [4]. It includes the designed system that is used to monitor or gain the temperature value, including humidity also the moisture presents in soil with the sunlight that is required for the growth of the plant Yogendra Parihar [5], Mahir Dursun and Semih Ozden [6]. All these factors are monitored to gain the most of the production and high-quality gain. The controllers used here are for the real time use that is the drainage and light control in greenhouse. The paper for solar based PV conditioning power. This particular writing mentions the design of remote and controlling system that is based on solar S. Harishankar, R. Sathish Kumar, and T. Viveknath [7]. Sudharsan the K.P, Photovoltaic U. Vignesh (PV) Power Conditioning which is basically used in a environment of greenhouse. The structure of this system that is used to monitor is used using IoT. Pavithra D. S, M. S. Srinath [8] This is used using internet with use of host, network GPRS. This was built to gain the maximum produce in the worst-case scenarios. The information is further sent to the android used to take actions Laxmi Shaadi, Nandini Patil, Nikita. M, Shruti. J, Smitha. SiSwati .C [09].

III. PROPOSED SYSTEM

HARDWARE COMPONENTS

1. Sensors (Moisture, DHT11, MQ135)
2. ESP8266 Wi-Fi module
3. Node MCU
4. Water Pump
5. Relay Circuit
6. PIR Motion Sensor

SOFTWARE COMPONENTS

1. Google firebase

DHT11 Sensor Module:

This sensor module is the 3-pin module which includes the ground, data and Vcc. This is used in this project to gain the value of humidity and required value of temperature that will be required in this proposed system. This sensor has the range of temperature from 0 C to 50 C. and the humidity is gained in the range of 20% to 90 %. Fig 1.

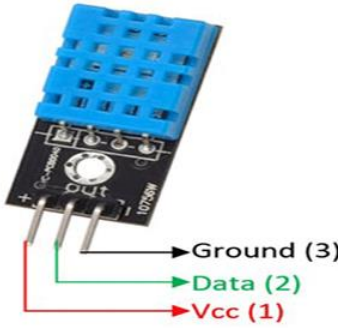

Fig. 1 DHT11 sensor

Node MCU:

Node MCU is an IOT platform which is open sourced and low cost. The firmware that works on ESP8266 Wi-Fi is included in this node MCU. Node MCU is the modified microcontroller used the project purpose as it the electronic prototyping fig 2.

Fig. 2 Node MCU

Sensor for moisture in soil:

This sensor of soil moisture is required to measure the content of water in volumes which is basically done using the two probes that are connected to the sensor. This attached probe allows to gain the value of moisture in the soil by passing the current in the soil. The inverse proportion of the current and resistance is required to gain the moisture in the soil. Therefore, when there is more water in the soil the value of resistance is low and similarly when water present is less the value of current is low and resistance value is high. Two different modes are used to connect this one is the analogy mode and other is the digital one fig 3.

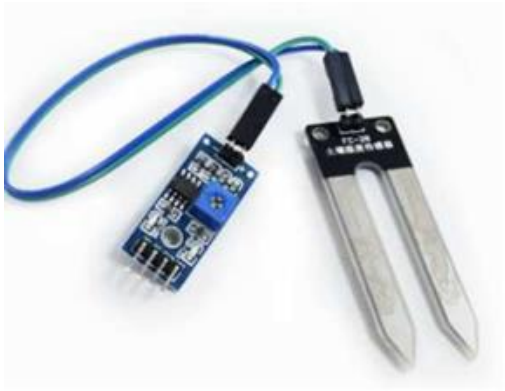

Fig. 3 Sensor for moisture in soil

Relay Circuit:

Here relay circuit is used to switch on and off the electronic valve which is controlled by the Arduino the electronic valve works on 12 V supply to provide 12 V to electronic valve relay circuit is used using Arduino we can switch on and off the relay which will control the switching operation of Heater

Transistor:

SPECIFICATIONS	ARDUINO UNO	ESP8266	REFERENCES
Working Access	Sigle core	Two core mutli in-built code.	[5] K Lokesh Krishna, J Madhuri et al..
WI-FI SUPPORT	NO WI-FI Support available	WI-FI Support is available	[3] Marwa Mekki et al..
COMMUNICATIONS	Lack of built communications	In built communication	[2] Arul Jai Singh et al..

Transistor BC547 is used for switching purpose. As the water pump works on 10v and microcontroller works on 5v so to switch the supply between these two elements we use the required transistor.

IV. SYSTEM IMPLEMENTATION

An important factor such as temperature and humidity of the environment Can be monitored using DHT 11 The control on the temperature is done using DC motor which acts as cooling mechanism. Temperature and the humidity will be sensed by DHT11 sensor digitally. The CO2 gas will be sensed by the MQ135 sensor and Other MQ sensors is also provided for the knowledge of the different atmosphere released gasses of that surrounding. The ESP8266 microcontroller is used to send all the monitored parameter and different gasses on IoT Cloud using Wi-Fi. And to monitor a moisture in soil the moisture sensor is used and also relay for controlling water pump to maintain the moisture sensor of the soil. All the sensors are interfaced with ESP8266 micro-controller and regulated DC power supply is used. The water level in the soil is detected using the soil moisture detector and further actions are taken accordingly.

V. EXPERIMENTAL RESULT

As mentioned, and as tested the project results in the accurate manner which includes the various factors. The automatic switching of the pump is seen when the server is connected and all the connected devices start working which will then save the plants from the harmful unexpected weather. The result of the project referred

Comparison table 1

paper [6] Arul jai Singh “embedded based greenhouse monitoring system using pic microcontroller is show in the comparison table 1.

To ensure reliability, a system must achieve measurement accuracy above 90%. This article presents an IoT-based On-Grid photovoltaic power monitoring system designed to measure electrical parameters with high accuracy. The system uses the PZEM004T sensor and Node MCU ESP8266,[8] which transmits data to the Blynk IoT server over an internet connection. The system's accuracy is assessed using the Mean Absolute Percentage Error (MAPE) calculation. Results show that this system achieves an accuracy of 96.37%, indicating high reliability and suitability for practical use due to its accuracy above 95%. This makes the designed system highly reliable, effective, and feasible for monitoring On-Grid Photovoltaic Power Plants.

VI. CONCLUSION

In this project, we implemented an automatic irrigation facility which one can easily control from their home by using a simple online application. Labor work would be eliminated and we would get accurate

results. The proposed system can reduce the efforts of farmers and provides a high yield. It also conserves water for irrigation by locating the sensor at the right position above the soil level. This work has shown that plants can still sustain at low moisture level when the temperature is moderate. Analysing more than one parameter has made this system an efficient one for managing the field. The Future Scope of this Project never be ended Because in today fast World every person will Require a helping hand to take care of plant and Plant health status. This is Further used for large Scale of Agriculture Purpose to increase the Crop Rate and help farmers to reduce man power. Machine results and sensing provide accurate results which will help optimize production. With IOT the Plant Monitoring system can be made portable. Plant Monitoring system can be set up in extreme climatic conditions as the automated system will continuously make alterations such that suitable conditions for the plants are sustained.

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