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International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

"Greenhouse Monitoring System using IOT"

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Abstract

Managed areas for the production of plants are greenhouses. Because current greenhouse plants restrict themselves, they are not automatically controlled and have to be manually operated with various documents. The system suggested must be monitored and controlled continuously to ensure optimal growth of plants, e.g. temperature, moisture, soil humidity, light intensity etc. This work shows a management mechanism for children's nurseries over the Internet of Things (IOT). The System can check for evident conditions, such as humidity, soil immersion, temperature, fire proximity, strength of light, etc. With Node MCU esp8266, all data from the environment parameters are sent to the nube. If a parameter exceeds the limit set, the associated actuator is switched on. If the Earth parameter does not meet the required value, the microcontroller turns on the motor. A mobile phone and desktop allows the user to display and monitor parameters.

INTRODUCTION

A greenhouse is an isolated building to provide suitable environmental conditions for growing plants. The temperature, humidity, light and the level of the carbon dioxide and irrigation are the important factors for the productivity of a greenhouse [1]. Wired and wireless monitoring and management systems in agriculture or greenhouse areas are becoming widespread because of the developments of the new sensors and electronic communication systems nowadays. It is possible to follow up the soil and grown of the agricultural products by using computer-aided monitoring systems in agricultural areas or greenhouse systems. By means of these systems, labor force requirement and production time can be optimized by increasing the productivity of soil by providing light, temperature, humidity, carbon dioxide (CO_2), vegetable nutrients and irrigation in the required time intervals in order to provide the optimum environmental conditions. There are some previous studies to monitor or track the greenhouse system in the literature. In 2004, Omid [2] presented a computer-aided monitoring system to maintain optimum air temperate and relative humidity in greenhouses. In 2008, Ahonen [1] and his friends have developed a Wireless Sensor network for monitoring climate parameters in a greenhouse. In 2015, Dan et.al. presents the design and implementation of an agriculture greenhouse monitoring system based on ZigBee technology. In 2016, Emreet.al. presents a low-cost wireless sensor network application to monitor climatic conditions and relative humidity of the greenhouse systems. In this study, a wireless greenhouse monitoring system based on IoT technology is presented by using Arduino compatible NodeMCU. The proposed greenhouse monitoring system based on wireless networks with IoT support with low costs that is suitable for small or medium businesses.

The system consists of three important parts: wireless modules, web service and the web server with a database. The detailed description of each part will be explained in the materials methods section. Theproposed system differ from the existing system in term of low Cost , easy Install and Scalability.

LITERATURE SURVEY

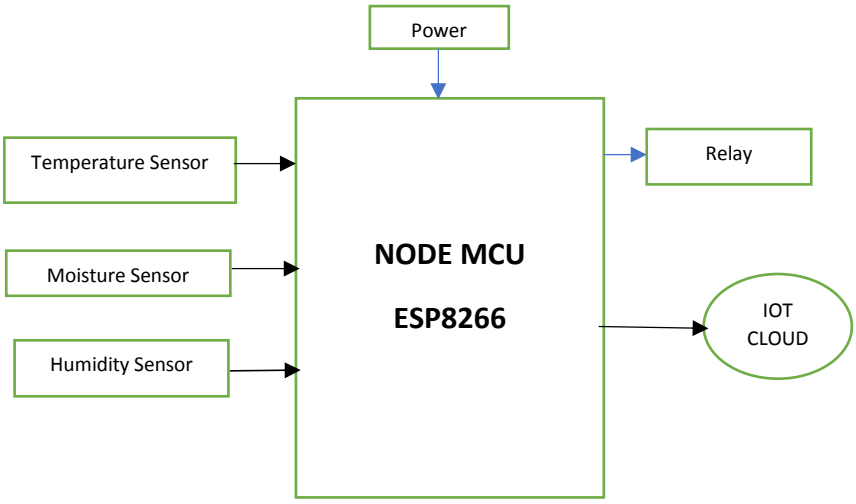
1. Somnath D. Bhagwat, AkashI.Hulloli, SurajB.Patil, Abulkalam.A.Khan,Mr.A.S.Kamble,"SMART GREENHOUSE USING IOT AND CLOUD COMPUTING", International Research Journal of Engineering and Technology, Volume 5,issue 3,March 2018.
   In this paper, they have introduced the smart greenhouse farm using IOT and cloud computing technology. Greenhouse always play an important role in the agriculture and in the gardening sectors as they can be used to grow plants under controlled climatic conditions. Different sensors like temperature, soil moisture, sunlight are being used to control the farm.
2. Mohammad WoliUllah, Mohammad Golam Mortuza, MdHumayanKabir, Zia Uddin Ahmed, Sovan Kumar DeySupta, ParthoDas,"Internet of Things Based Smart Greenhouse: Remote Monitoring and Automatic Control", International Conference on Electric and Intelligent Vehicles(ICEIV 2018)

This paper provides the information about the system monitors temperature and humidity, soil moisture and take action according to results. It includes with a database helpful for future analysis and reports.

METHODS AND METHODOLOGY

The greenhouse system comprises the monitoring area and the control area. A DHT11 sensor, an LDR sensor, a moisture sensor on the floor and a flame sensor track environmental parameters are included in the control portion. ESP8266 is used to submit IOT cloud systems with environmental parameters [4]. A fan, water pump and artificial light are in the control area. The ESP8266 is the standard controller used to connect all sensors to each

other. To detect the temperature inside the greenhouse the temperature sensor is used. The ESP8266 receives the sensor readings. All of these relays is connected to the Buzzer. If the temperature exceeds the threshold level, the ESP8266 transmits signals to activate the fan. LDR sensor for detecting the intensity of sunlight in the greenhouse. The microcontroller sends signals using artificial light to increase the strength of light if the amplitude is below the threshold value. The ESP8266 can transmit signals using artificial light to increase the light intensity when the amplitude is below the threshold value [5]. The moisture sensor is used to detect moisture and the soil moisture sensor is used to detect moisture from the soil. If the sensor's measured humidity value is above the threshold value, Using a water pump, water is transferred. If soil moisture is limited, the buzzer will be turned on by the ESP8266 to decrease moisture and open the water outlet to increase soil moisture. Data on these parameters would be sent to the IOT module at the same time (ESP8266). Regardless of any threshold mismatch observed, the details sent to the IOT will be forwarded periodically. The ESP8266 is a microcontroller link chip for linking TCP/IP links and transmitting the data into Wi-Fi. The information that these sensors detect is then sent to the IOT. And then send it to your laptop and smartphone.



Block Diagram

COMPONENTS -:

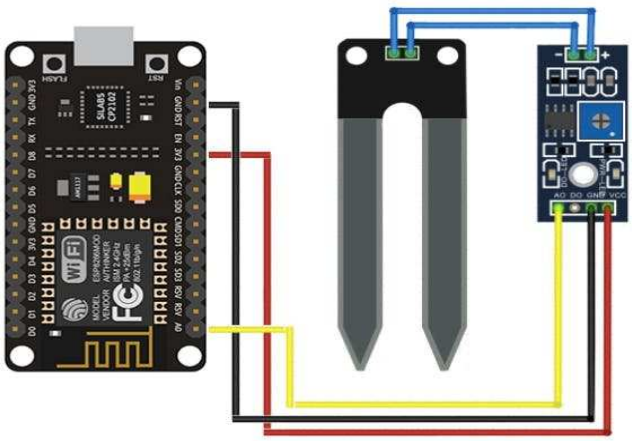
Node MCU

Node MCU is an Internet of Things (IoT)-focused open-source Lua-based firmware and development board[9]. It includes software for Espress if Systems' ESP8266 Wi-Fi SoC as well as hardware for the ESP-12 module. The major argument for choosing this is that it is cheap and includes a built-in Wi-Fi module[10]. Because it is similar to Arduino, it can be programmed using the Arduino IDE software. It has ten General Purpose Input/output pins for connecting to external devices. A standard Node MCU, complete with pin numbers.

Soil Moisture Sensor

The Soil Moisture Sensor is a straightforward breakout for determining the moisture content of soil and other similar materials. The soil moisture sensor is simple to set up and operate. The sensor's two big exposed pads serve as probes, and combined they operate as a variable resistor.The greater the amount of water in the soil, the better the conductivity between the pads will be, resulting in a lower resistance and a larger SIGout[13]. It's commonly used in greenhouses to regulate water supply and other bottle enhancements. Experiments in biology to track the amount of water in the soil.

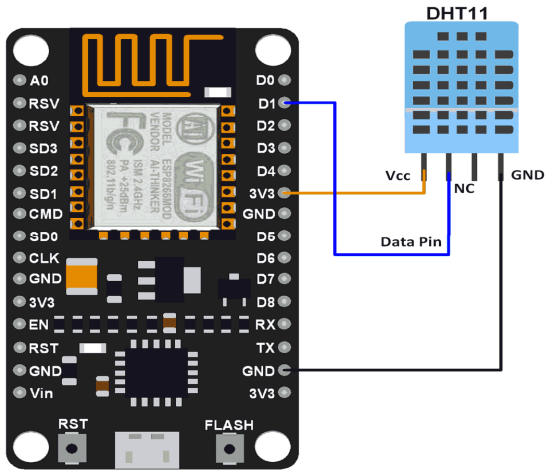
Step1: Circuit of NodeMcu, Humidity Temperature and soil moisture sensor for Plant Monitoring and control system



DHT 11

The dht11 sensor, which combines a temperature and humidity sensor, typically outputs either digital or analog data. It contains information about the temperature around the plant if it needs extra sunshine and the degree of humidity in the surrounding environment. Water vapor is detected by measuring the electrical resistance between the two electrodes. The humidity sensing component consists of the electrode and the substrate, which is responsible for retaining moisture while in contact with the surface. Ions are released by the substrate. The conductivity between the electrodes rises as soon as water vapour is absorbed by it. The calibration result of the dht11 sensor is quite accurate. Because of its small size and low power consumption, the DHT11 sensorhas a wide range of uses. It can also transmit signals over a distance of up to 20 meters. The product we used was a four-pin single row pin box.

Step 2: Circuit of NodeMcu, Humidity Temperature, LED and soil moisture sensor for Plant Monitoring and control system

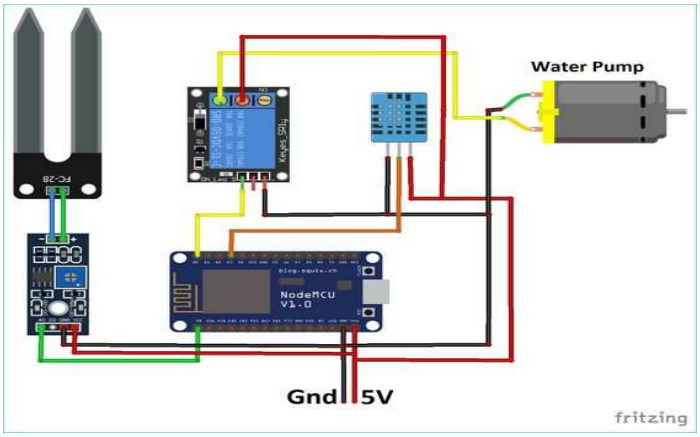


Relay

Within a relay, there is a core with copperwire wrapped around it (the coil). Under normal conditions, the switch (armature) remains in contact with the normally closed (NC) terminal. An electromagnetic field is generated when power is applied to the coil, and the coil begins to function as a magnet, attracting the armature to the normally open terminal (NO). At their most fundamental level, relays are nothing more than that.

Aside from that, there are a variety of other types of relays, such as solid state and thermal relays, all of which have distinct functioning processes but serve the same purpose. This portion is used to regulate the small dc pump, which is used to water the plants automatically, and the flow is regulated by a relay. Relays are used toswitch control circuits that handle lower currents. Furthermore, it can manage even greater voltages and amperes with the assistance of amplification.

Step 3: Plant Monitoring system circuit diagram with relay Module



Blynk APP

Blynk is a platform that allows you to control Arduino, Raspberry Pi, and other devices via the Internet using IOS and Android applications. It's a digital dashboard where you may drag and drop widgets to create a graphic interface for your project. Blynk is a programme that allows you to create your own apps. It can be applied to a single project or a number of them. Virtual LEDs, buttons, value displays, and even a text terminal, as well as the ability to interact with one or more devices, may be incorporated in any project.

RESULT AND DISCUSSION

We have planned this System to track and monitor environmental parameters. The result was focused on the efficient control of the greenhouse environment by automated means. The automated control mechanism is performed entirely on the basis of coding. Temperature, humidity, soil moisture, content are controlled by portable devices such as mobile devices. The output of System and laptop are shown in Figure 1 , 2,3.

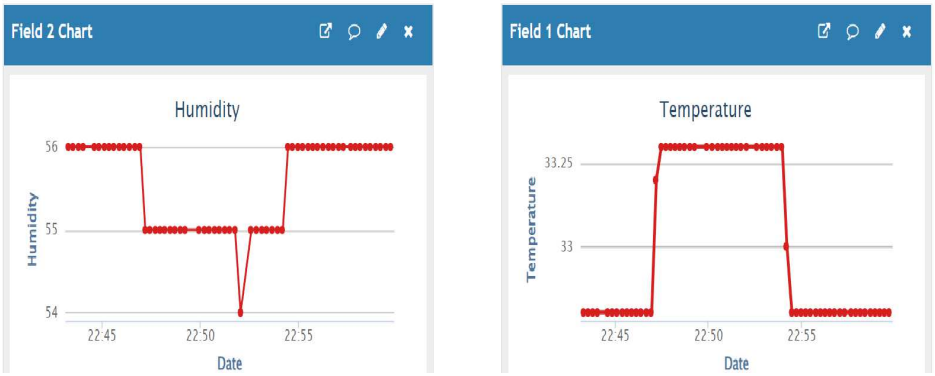


Fig 1. Graph of Humidity and Temperature

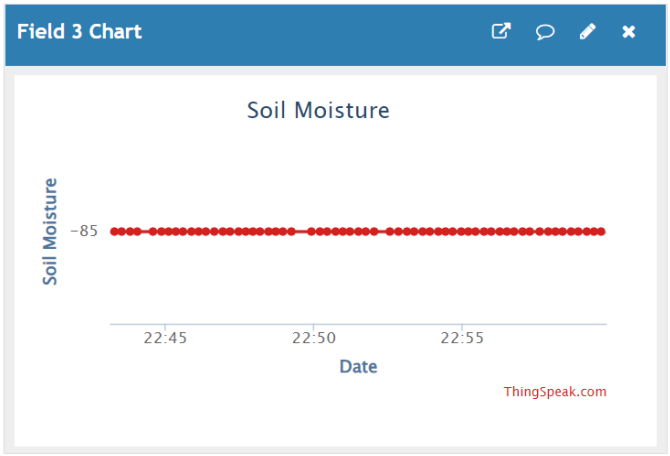


Fig 2: Graph of Soil Moisture Ssensor

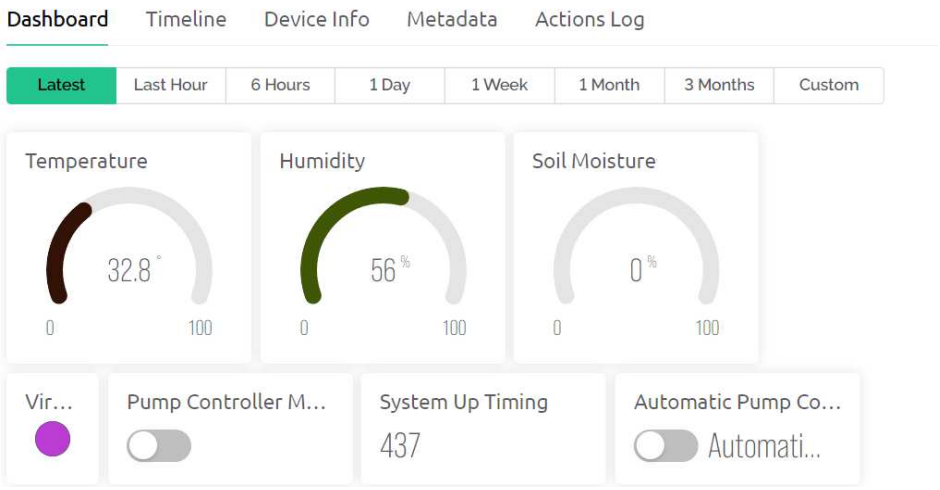


Fig 3: Data on Blynk app

CONCLUSION

The greenhouse control and power system based in Arduino is master mind. DHT11 sensor, Earth Humidity Sensor, LDR sensor and the fundamental sensors used in this experiment include a thorough assessment of temperature, dampness, adhesive content and light strength. This method is popular in children's nurseries to monitor and monitor ecological parameters using a reasonable smartphone application. NodeMCU esp8266 is used for sending the phone information and desktop information. This procedure decreases physical activity. In plant fields, nurseries, and homecenters, this machine can be used.

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