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Smart Farming System by Creating Artificial Environment using IoT for Efficient Crop Growth

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Abstract: ***This paper presents the growth of plants effectively in less duration of time compared to traditional farming. In this the farming is done inside the packed electronic environment by using the artificial environment through Led's for growth of plants. The photosynthesis process is carried out by the plants is dependent on the led's. In this project we are using two sensors they are DHT11 which is used to monitor the temperature and humidity parameters and MQ135 which is an air quality sensor for monitoring the environment of the particular region and controlled using Node MCU. All the equipments are monitored using Iot. If any of these parameters is in abnormal condition then exhaust fan get turned on, so that we can reduce the humidity. Blynk application is used for displaying information. By using these parameters the rate of plant growth is doubled. Results shown that when all the factors of plant growth are stabilized, then it is possible to grow a plant in less time compared through normal plant time because photosynthesis is carries throughout the day.***
Keywords: NODE MCU, DHT11SENSOR, MQ135 SENSOR, BLYNK APP, EXHAUST FAN, etc

I. INTRODUCTION

The basic necessities that human beings needs to survive are food, water and shelter. Every human needs proper and better quality food in order to stay healthy. But now a day's food security has become a great concern because of alarming rise in population and due to deforestation, overuse of chemicals and many other factors the arable lands are degrading drastically .So, down the line there are high chances of falling into malthusian trap. This means that one day there will be raise in population but the food we have will be insufficient to feed the population and it becomes main challenge for our country in the near future. And it also creates direct impact on our economy. So, we need a better technology in order to enhance the food production. Here our project works. The main purpose of our project is to increase the food production by creating artificial environment. When vegetables are grown in the open field, their quality and productivity tend to vary with the local climate, weather conditions and soil fertility.

The artificial environment is an approach to grow crops in a controlled indoor environment. As the environment is indoor it will not have any insects, and pests affecting the crops, hence no insecticides and pesticides will be required. The indoor environment will neither evaporate water nor will percolate it in to the earth hence water requirements be very small. The indoor environment is equipped with artificial lightening, so crops can be grown independent of season.

II. LITERATURE SURVEY

The basic factors affecting plant growth are sunlight, water content in soil, temperature, etc. Because the temperature and humidity of greenhouse must be constantly monitored to ensure optimal conditions, sensor network can be used to gather the data from point to point. The data from the greenhouse will be measured by the sensor and the data that are collected will be sending to the receiver. By using this system, the process of monitoring is easier and it is also cheaper for installation and maintenance process. Greenhouse prevents the plant from the effects of climate inspect and so on, which makes great sense for agricultural production. This designed system for monitoring and controlling the environment which is based on measuring the humidity and temperature by a sensor that located at different places. The monitoring and controlling of environment parameters are conducted through Android Smartphone. System consists of the DHT11 sensor for the humidity, microcontroller, wireless connection, and power supply unit. The input to the microcontroller is the values from the sensor. In this work, we've been focused on design and implementation for monitored climate conditions and to control the different devices on output (exhaust fan, etc.,) ,Various inputs (sensors) are installed and connected to controller circuit (NodeMCU ESP8266) determined as data acquisition. An application called BLYNK is used to retrieve and display the condition of climate by sensing data.

III. BLOCK DIAGRAM

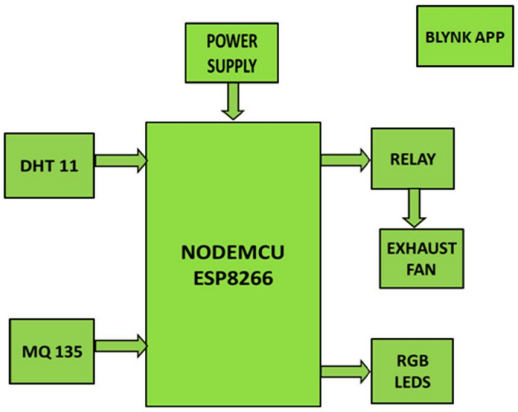

Fig 1: Block diagram

IV. HARDWARE REQUIREMENTS

A. NODEMCUESP8266

The Node MCU is an open-source firmware and development kit that helps to prototype IOT products.
It is interactive, programmable, low-cost, smart WIFI enabled chip. The ESP8266 is the name of a micro controller used and this module and a rich assortment of pin-outs. It has built-in USB serial chip to upload codes, a 3.3V regulator, and a logic level converter circuit so you can quickly download codes and connect your circuits. This microcontroller module can be easily configured using Arduino IDE Software.

B. DHT11 Sensor

The DHT11 is Temperature and Humidity Sensor features a calibrated digital signal output with the temperature and humidity sensor capability. It is integrated with a high-performance 8-bit microcontroller. Its technology ensures the high reliability and excellent long-term stability. This sensor includes a resistive element and a sensor for wet NTC temperature measuring devices. It has excellent quality, fast response, anti-interference ability and high performance. The sensor can measure temperature from 0°C to 50°C and humidity from 20% to 90% with an accuracy of ±1°C and±1%.The humidity sensing device DHT11 is a moisture holding substrate with the electrodes applied to the surface area. The change in resistance between the two electrodes present is proportional to the relative humidity. Humidity sensors work by detecting changes that alter electrical currents or temperature in the air.

C. MQ13 Sensor

The MQ-135 gas sensor senses the gases like ammonia nitrogen, oxygen, alcohols, aromatic compounds, sulphides and smoke. The boost converter of the chip MQ-3 gas sensor is PT1301. The operating voltage of this gas sensor is from 2.5V to 5.0V. The MQ-3 gas sensor has a lower conductivity to clean the air as a gas sensing material. In the atmosphere we can find polluting gases, but the conductivity of gas sensor increases as the concentration of polluting gas increases. MQ-135 gas sensor can be implementation to detect the smoke, benzene, steam and other harmful gases. It has potential to detect different harmful gases. The MQ-135 gas sensor is low cost to purchase.

D. Relays

A relay is an electromechanical switch, which perform ON and OFF operations without any human interaction. General representation of double contact relay is shown in fig. Relays are used where it is necessary to control a circuit by a low-power signal (with complete electrical isolation between control and controlled circuits), or where several circuits must be controlled by one signal.

E. RGB LEDs

RGB LEDs have three internal LEDs (Red, Green, and Blue) that can be combined to produce almost any color output. In order to produce different kinds of colors, we need to set the intensity of each internal LED and combine the three color outputs. we are going to use PWM to adjust the intensity of the red, green, and blue LEDs individually and the trick here is that our eyes will see the combination of the colors, instead of the individual colors because the LEDs are very close to each other inside.

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F. Exhaust Fan

Exhaust fan is a type of fan designed to circulate air in an enclosed area. It is an automation system for ventilation. The primary purpose of using exhaust fan is to remove the moisture out of the area. These fans helps to control and eliminate the odors. To run the exhaust fan we need 12V power supply where 12V of Dc voltage is converted into 5V.

V. SOFTWARE REQUIREMENTS

A. ARDUINO IDE

Arduino IDE is a cross platform application and the functions are written in C and C++. The IDE provides software library from wiring project .The arduino IDE is capable of converting executable code into hexadecimal encoding using loader program. It is possible to integrate and upload programs to the board with a single click.

B. BLYNK APP

BLYNK is a Platform with IOS and Android apps to control arduino, Raspberry Pi and the likes over the Internet. It's a digital dashboard where you can build a graphic interface for your project by simply dragging and dropping widgets. It's really simple to set everything up and you'll start tinkering in less than 5 minutes. Whenever the Arduino or Raspberry Pi is linked to the Internet over Wi-Fi, Ethernet or this new ESP8266 chip, the Blynk application will get you online and ready for the Internet of Your Things. The Blynk App is a well designed interface builder. It works on both iOS and Android. The Blynk app can be monitored using smart phone.

VI. WORKING MODEL

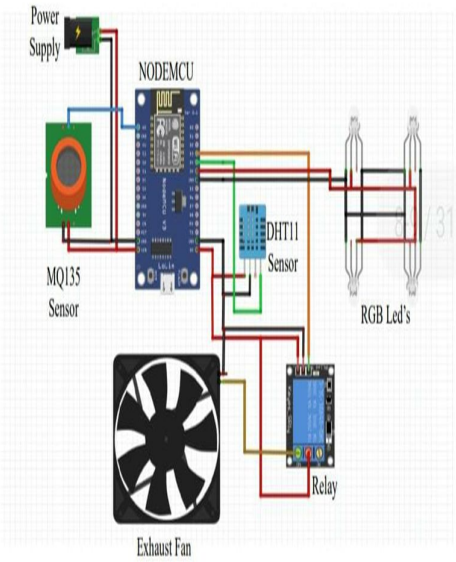

Fig 2: Working Model

The key aim of modern agriculture is to enhance the growth of plants for a maximum yield. It maintains the microclimatic parameters in a correct ratio as per the requirement of the plants. DHT11 Temperature & Humidity Sensor features a temperature & humidity sensor complex with a calibrated digital signal output. By using the exclusive digital-signal-acquisition technique and temperature & humidity sensing technology, it ensures high reliability and excellent long-term stability. The values are stored as programmers in the OTP memory, which are used by the sensor's internal signal detecting process. We are using a RGB lights and they generate the light source for some wavelengths which are used for absorbing the light for plants and they are responsible for development of that particular plant. If any of the humidity or temperature value increases the relay and exhaust fan turns on the control the environment.The data from Humidity and temperature sensors, is sent to the digital pins of the Node MCU. Serial monitor displays the data given by sensors if serial functions are written in the code and if serial communication between the Node MCU and the device exists. Name of the Wi-Fi network and password are written along with the Authentication token in the code to connect the hardware to blynk app. When the code is dumped into the hardware, from then the status of the crops is seen on smart phone when connected to Wi-Fi. The notifications received and the values of humidity, temperature and in blynk for the Smart Farming system are as shown in the blynk app.

VII. FLOW CHART

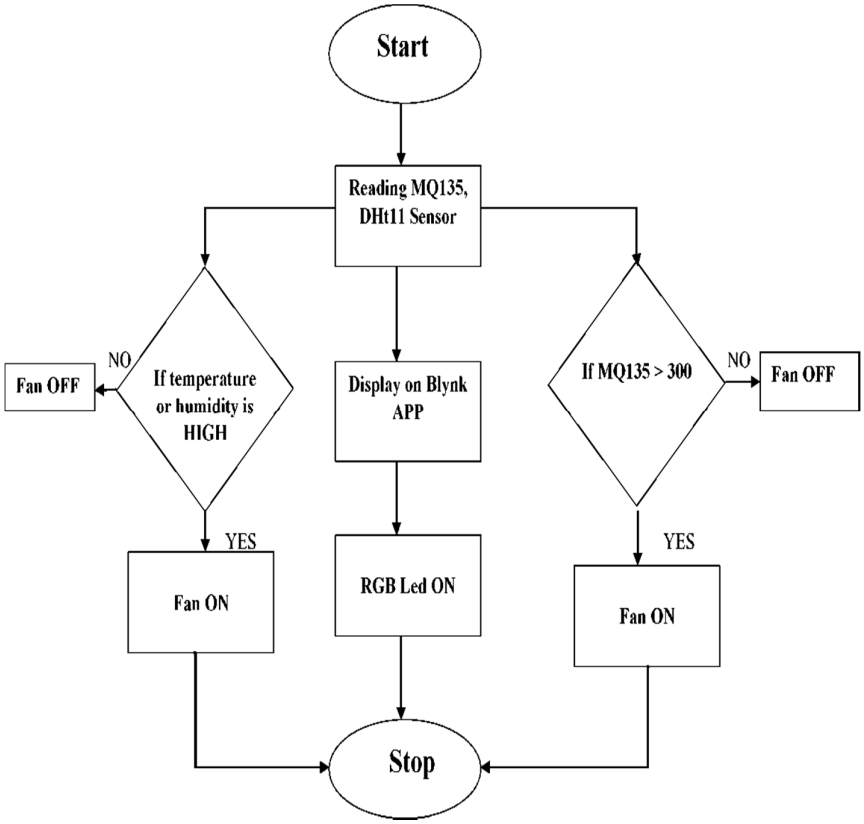

Fig3: Flowchart

VIII. RESULTS

The hardware model of the project is

Fig4: Hardware Component

A. Outputs

1) Case:1: If the temperature or humidity is normal according to plant environment which we assign for different plants growth then below fig outputs are obtained

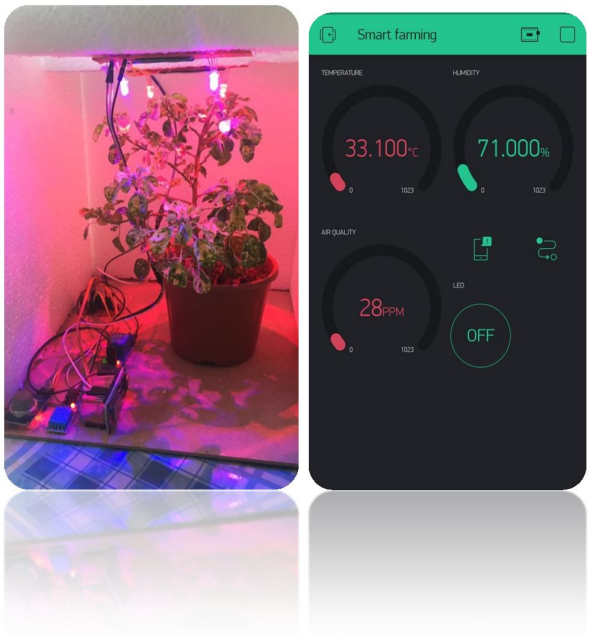

Fig4: Result for Case-1

2) Case 2: If the temperature exceeds above the assigned values then notification gets displayed in Blynk application and relays gets operated. The output for the above case is

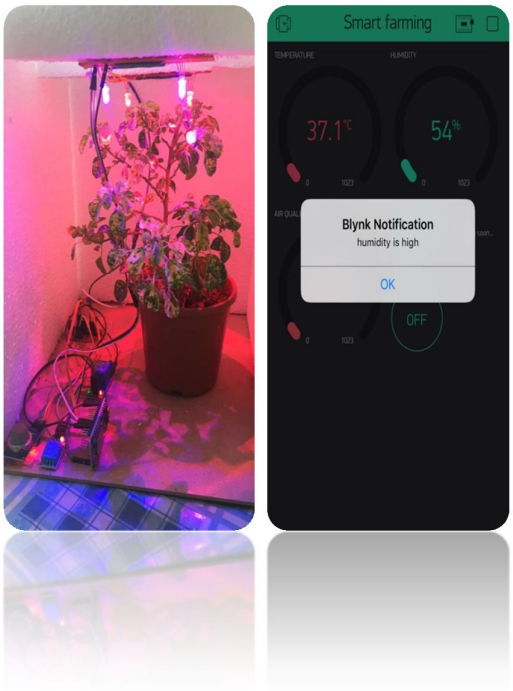

Fig5: Result for case-2

IX. CONCLUSION AND FUTURE SCOPE

By using this technology, a system that cultivate crops with productivity rate being doubled has been developed successfully. This system has provided maximum yield of crops in reduced time. As a result of day-to-day progression a better yield of plant was produced. As a future purpose the above model can be implemented by assigning solar panels at top for continues electric supply. Automatic water supply can also be provided to supply required water when needed.

REFERENCES

[1] Uday A, Waykole & Dhiraj G. Agarwal, "Green house automation system" International Journal of Latest Trends in Engineering and Technology (IJLTET), Vol. 5 Issue 4 July 2015
[2] Alison Lederer, "Investigation of Photosynthetic Properties in Spinach and Geranium: Pigments, Starch Production, and Light Wavelength Absorbance". ESSAI, Vol. 5 [2007], Art. 29, 1-1-2007
[3] Hau-Chen Yen, Ching-Ran Lee, Shun-Yu Chan, "Artificial- Lighting Source for Plant Growth". 2013 IEEE 10th International Conference on Power Electronics and Drive Systems (PEDS)
[4] McGill University, Urban Barns Report, May 5, 2014 Polina Fateeva and Mark Lefsrud, "LEDs: Shedding Light on Optimizing Plant Production" McGill University.
[5] Kelsey A. Czyzyk, Shayne T. Bement, William F. Dawson and Khanjan Mehta, "Quantifying Water Savings with Greenhouse Farming" Global Humanitarian Technology Conference (GHTC), 2014 IEEE, 04 December 2014
[6] Philips greenhouse LED production module & Robert Colangelo, "Indoor vertical farming, more growth, less footprint" PHIL 151012 Case Study Green Sense Farms UK A05, 01/2015
[7] A Smart Green House Automation System by Wireless Sensor Networks International Journal of Research in Advent Technology, Vol.5, Issue 3, March 2017 E-ISSN: 2321-9637

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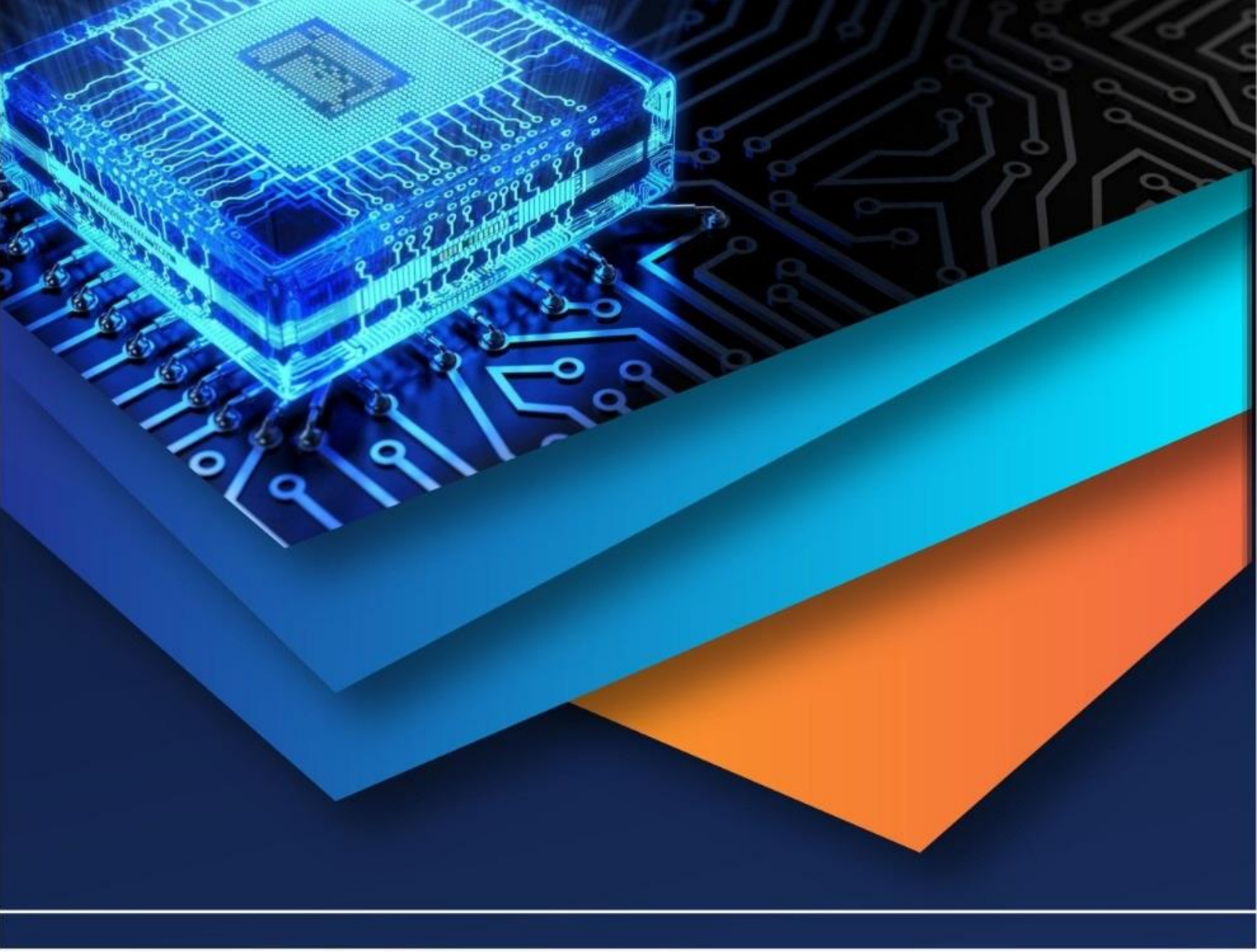

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