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IOT base Greenhouse Monitoring and Controlling System

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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 Nodemcu Esp 8266, 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.

I. INTRODUCTION

In recent years improvements in sensor manufacturing technologies have occurred driven by post-process high-speed, low-power and low-cost microelectronic hybrid circuits.The requirement for commercial competiveness is sequential enhancement of quality and product reliability. Furthermore, it is important to know the degree of efficiency of each sensor related to its calibration circumstances and sensing mechanism.We live in the world where everything can be controlled and operated automatically, but there are still few sectors in our country where automation has not been adopted or not being put to a full-fledged use, perhaps because of several reason one such reason is cost and one such field is ‘agriculture’. Agriculture has been one of the primary occupations of man since early civilization and even today manual interventions in farming are inevitable. Greenhouse form an important part of the agriculture and horticulture sectors in our country as they can be used to grow plants under controlled climatic conditions for optimal growth.Greenhouse technology is the technique of providing favorable environmental conditions for plants.It replaces the direct supervision. Now a day, due to urbanization and lack of land availability there is a great need to construct the greenhouse, which will be revered mainly for growing crops.

II. RELATEDWORK

From the existing methodology we have taken the sensors like DHT11,Soil Moisture and LDR sensors to measure parameters like temperature & humidity, water content in the soil and light intensity levels in the soil respectively. In Addition to that, we have added CO2and UV are used to measure carbon dioxide gas level, intensity of incident ultraviolet radiation. Along with that we have used a Fire sensor to protect the system when any sort of fire occurs within the system.

III. METHDOLOGY

The total progresses of method square measure tired this technique by mistreatment the materials that square measure used their process additionally explained clearly.

A. NODE MCU

NodeMCU comes with variety of GPIO (General Purpose Input Output) pins. Following figure shows the pin diagram of the board. There is a candid distinction between VIN and VU wherever former is that a regulated voltage which will stand somewhere between 7 to 12 V whereas later is that the power voltage for USB that has got to be unbroken around 5V.Node MCU V3 is principally employed in the Wi-Fi applications that most of the opposite embedded modules fail to method unless in corporate with some external Wi-Fi protocol. Following are some major applications used for NodeMCU V3.

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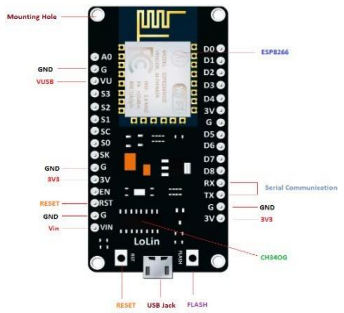

B.SENSOR

A sensor (also called detectors) is a device that measures a measurable attribute and converts it into a signal which can be read

by an observer or by an instrument. For example, a mercury-in-glass thermometer converts the measured temperature into expansion and contraction of a liquid which can be read on a calibrated glass tube. A thermocouple converts temperature to an output voltage which can be read by a voltmeter.

1) **TEMPERATURE SENSOR:**

Temperature Sensor which converts temperature value into electrical signals. We used IC called LM 35 as a temperature sensor. LM35 series sensors are precision integrated-circuit temperature sensors whose output voltage is linearly proportional to the Celsius temperature. The LM35 requires no external calibration since it is internally calibrated. . The LM35 does not require any external calibration or trimming to provide typical accuracies of ±1⁄4°C at room temperature and ±3⁄4°C over a full −55 to +150°C temperature range. 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

Features

- Calibrated directly in ° Celsius (Centigrade)
- Linear + 10.0 mV/°C scale factor
- Suitable for remote applications
- Low cost due to wafer-level trimming
- Operates from 4 to 30 volts
- Low self-heating, 0.08°C in still air

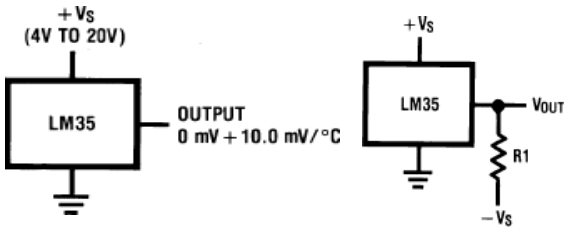

Figure: Temperature Sensor

2) SOIL MOISTURE SENSOR

Soil Moisture Sensors Measure The Water Content In Soil. A Soil Moisture Probe Is Made Up Of Multiple Soil Moisture Sensors. One Common Type Of Soil Moisture Sensors In Commercial Use Is A Frequency Domain Sensor Such As A Capacitance Sensor. Another Sensor, The Neutron Moisture Gauge, Utilize The Moderator Properties Of Water For Neutrons. Cheaper Sensors -Often For Home Use- Are Based On Two Electrodes Measuring The Resistance Of The Soil. Sometimes This Simply Consists Of Two Bare (Galvanized) Wires, But There Are Also Probes With Wires Embedded In Gypsum

Agriculture:

Measuring soil moisture is important in agriculture to help farmers manage their irrigation systems more efficiently. Not only are farmers able to generally use less water to grow a crop, they are able to increase yields and the quality of the crop by better management of soil moisture during critical plant growth stages.Besides agriculture, there are many

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other disciplines using soil moisture sensors. Golf courses are now using sensors to increase the efficiencies of their irrigation systems to prevent over watering and leaching of fertilizers and other chemicals offsite.

3) HUMIDITY SENSOR:

A sensor (also called detectors) is a device that measures a measurable attribute and converts it into a signal which can be read by an observer or by an instrument. For example, a mercury-in-glass thermometer converts the measured temperature into expansion and contraction of a liquid which can be read on a calibrated glass tube. A thermocouple converts temperature to an output voltage which can be read by a voltmeter.

A humidity sensor also called a hygrometer, measures and regularly reports the relative humidity in the air. They may be used in homes for people with illnesses affected by humidity; as part of home heating, ventilating, and air conditioning (HVAC) systems; and in humidors or wine cellars. Humidity sensors can also be used in cars, office and industrial HVAC systems, and in meteorology stations to report and predict weather.

A humidity sensor senses relative humidity. This means that it measures both air temperature and moisture. Relative humidity, expressed as a percent, is the ratio of actual moisture in the air to the highest amount of moisture air at that temperature can hold. The warmer the air is, the more moisture it can hold, so relative humidity changes with fluctuations in temperature.

C. Microcontroller :

In the processing part we are taking input and giving output. this stage controls the whole circuit . we are using microcontroller ATMEGA328 for processing part. First we have to program a microcontroller for that we used aurduino,s open source IDE , we program the microcontroller by coding in aurduino sketch and the language is embedded c. It is a is a low-power CMOS 8-bit microcontroller based on the AVR enhanced RISC architecture. By executing powerful instructions in a single clock cycle, the ATmega328 achieves throughputs approaching 1 MIPS per MHz allowing the system designer to optimize power consumption versus processing speed.

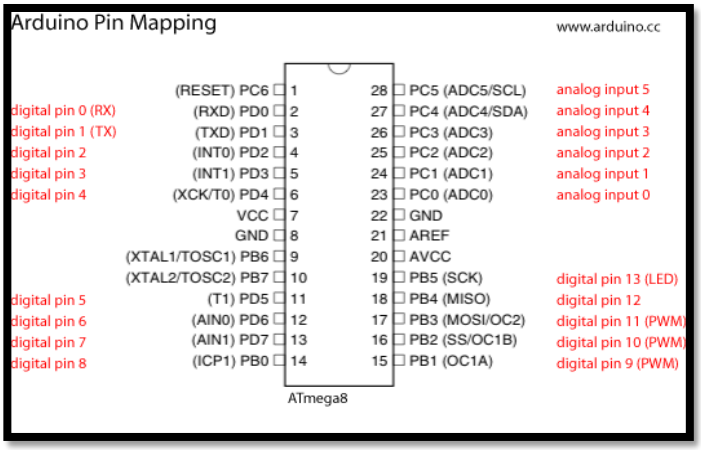

Fig :- microcontroller ATmega8

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The AVR core combines a rich instruction set with 32 general purpose working registers. All the 32 registers are directly connected to the Arithmetic Logic Unit (ALU), allowing two independent registers to be accessed in one single instruction executed in one clock cycle.

D. DHT11 SENSOR

This sensor is basically a low-cost digital humidity & temperature sensor. This sensor gives digital output and therefore, it can be directly connected to data 3 pins of the micro controller inspite of using ADC. It also consists of an eight bit micro controller to provide values of temperature & humidity in the form of serial data. It has 4 pins : VCC, GND, DATA and NC. It operates in between the range from 3.3-5 volts power supply. Humidity is determined by means of measuring the conductivity of liquid substrate that alters with exchange in humidity and the temperature is calculated by the usage of a thermistor.

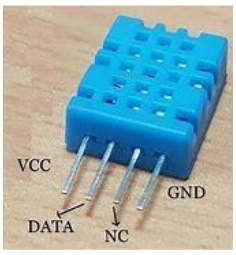

Fig. 3 DHT11 Sensor

IV.OVERVIEWOFPROPOSEDWORK

A greenhouse is a structure that is built of walls and is transparent roof and is designed to maintain regulated climatic conditions. These structures are preffered for the cultivation of plants, fruits, and vegetables which require a particular level of environmental parameters like sunlight,temperature, humidity and soil moisture. IoT and Arduino based Greenhouse Environment Monitoring and Controlling Project is designed to maintain and control the environment conditions in the greenhouse. It uses four sensors to detect the Temperature, Light, Humidity and Soil moisture in the Greenhouse. Temperature inside the greenhouse can be detected or measured by temperature sensor. Reading from the sensor.

Is sent to the micro controller. The micro controller is connected to different relays. One of those relays is connected to a blower. If the temperature is above or below the threshold value, then the micro controller would send signals to turn ON the Fan. In today's greenhouses, monitoring and controlling of many environment attributes are important for the good quality and productivity of plants. But to get the desired result some parameters like temperature, humidity, soil moisture, light intensity, carbon dioxide, UV radiation are important for better plant growth. So an Arduino based project is designed. Arduino microcontroller is used. Arduino can receive input from a variety of sensors and it can control actuators like motors, lights and other.

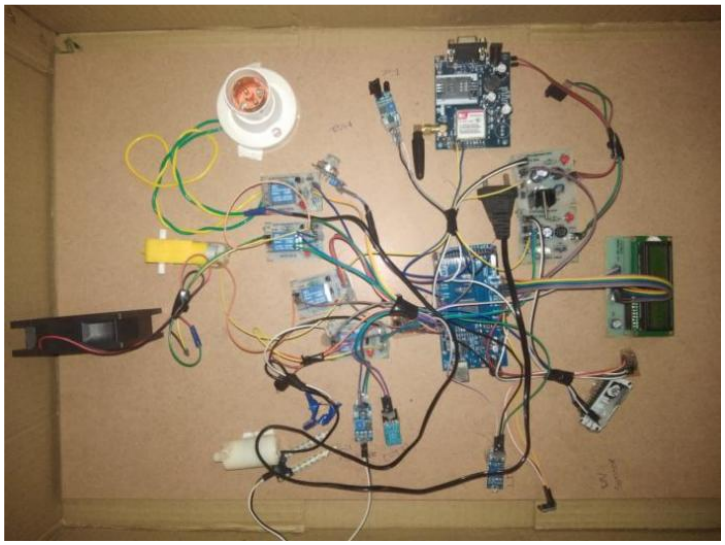

Fig.12 Monitoring Of Environmental Attributes in Greenhouse Using IoT

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V. BLOCK DIAGRAM

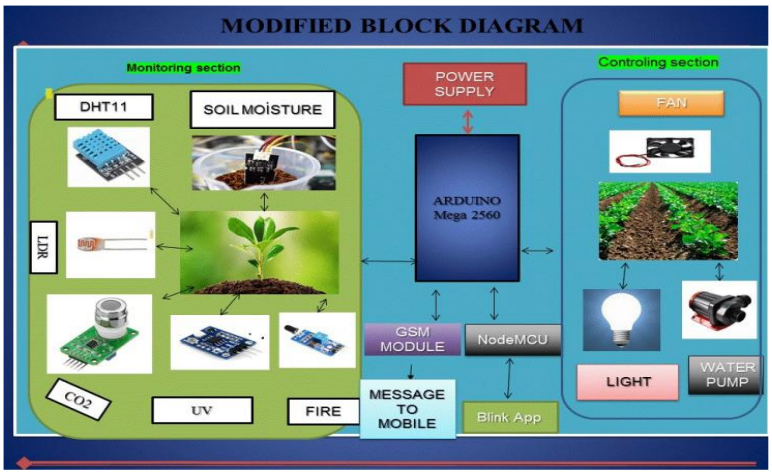

Fig.13 Block Diagram

Advantages

- This system helps in monitoring and controlling the climatic conditions that are favorable for the culyivation of a particular plant
- Maintain ideal micro- climate conditions
- In addition to ambient parameters ,smart greenhouse enable farmer to stay on top of their crop condition
- Control infection and avoid diseases outbreak
- Prevent thefts and improve security
- The projects is auto automated and does not require any human attention

Applications

- Outdoor temperature swings range widely between day and night .plants subjected to extreme cold and heat across a 24 hours period do not grow a well
- The enclosed indoor space greenhouse provide is typically temperature controlled with heaters and air ventilation for specific plant species ,such as food crops .
- Plants in greenhouses grow in containers with specifically chosen soil . So your greenhouse container soil does not have potential of harboring harmful diseases and pests . • The system will monitor the various environment conditions such as humidity , soil moisture ,temperature , presence of fire , etc . * Application
- This system enables its user to consult the climatic parameters and to order the greenhouse sub-system equipment's by SMS .
- The microcontroller –based solution consists of distributed wireless network , base or control station and user interface.
- Appropriate environmental conditions are necessary for optimum plant growth ,improved crop yield , and efficient use of water and other resources .
- This projects can be used in greenhouse , botanical gardens and farms .

VI. CONCLUSIONS

An Arduino based greenhouse monitoring and controlling system is designed. DHT11 sensor, Soil Moisture sensor, CO2 sensor, LDR sensor,UV sensor and Fire sensor are the main sensors used in this project which give the exact value of temperature, humidity, moisture content, CO2 level, light intensity, UV radiation and Smoke range respectively. This system is designed for controlling and monitoring environmental parameters in Greenhouse by a simple IoT connected blynk Application. This system reduces the power consumption, maintenance and complexity. This project can be used in agricultural field, in nursery and in botanical gardens.

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