Automation in Polyhouse using IOT based Technique

Vishal Parkhe[1], Roshan Sable [2], Gaurav Kajale [3], Rohit Mhaisdhune [4] ,Prof. Sharmila M.[5]
[1,2,3,4] *UG Student,* [5]*Assistant Professor*
Department of Electrical Engineering, Sandip Institute of Engineering and Management, Nashik, Maharashtra, India

Abstract **-** The poly-house can be in any shape it may be in tunnel and it is termed as poly tunnel. It may be also in square, semi-circular, elongated in shape. The polyhouse is covered with the polyethylene sheets. These sheets are used to stabilize the ultra violet rays and helps in proper photosynthesis in crops. The manual process for polyhouse is that the sunrays falls on it will pre-heat the air inside it. The major parameters to be considered for the polyhouse are temperature, humidity and the intensity of the light. The many polyhouse will be failed to show the result due to the manual error such as not maintain it properly. Three parameters are set only by the specification of the plant. Scientist proves that the polyhouse techniques can held 4 to 10 times more yielding than the normal method of farming techniques. Mostly the polyhouse is constructed in east to west direction in order to allow proper entry of sun light in polyhouse farming; we can protect our crops from any adverse environment such as high humidity or high temperature. There is a facility in polyhouse to control temperature or humidity.

Keywords - Arduino, IoT, Humidity sensor, Organic foods, Polyhouse, Temperature Sensor**.**

I. INTRODUCTION

Agriculture is the broadest economic sector which has major contribution in the development of India. India is also concentrating on the technological aspects. When technology and agriculture are integrated together that may yield good results. Conventional method of cultivation requires tremendous amount of time, human effort and requires continuous monitoring. There are several problems such as unpredictable weather conditions and the plants may be easily affected by pest and diseases in conventional method of cultivation. A polyhouse is a closed environment where the plants are grown on a controlled platform irrespective of climate and location. Generally, polyhouse is a structure built using bamboos or iron pipes which are covered with ultra violet sheet of certain thickness. The thickness of ultra violet sheets depends on the crop variety. Polyhouse provides a reliable and crucial way to generate higher revenues. Basically, it is an automation system which alters the physical parameters in favor of the plantation and growth. The polyhouse can be in any shape it may be in tunnel and it is termed as poly tunnel. It may be also in square, semi-circular, elongated in shape. The polyhouse is covered with the polyethylene sheets. These sheets are used to stabilize the ultra violet rays and helps in proper photosynthesis in crops. The manual process for polyhouse is that the sunrays falls on it will preheat the air inside it. The major parameters to be considered for the polyhouse are temperature, humidity and the intensity of the light. The many polyhouse will be failed to show the result due to the manual error such as not maintain it properly. Three parameters are set only by the specification of the plant. Scientist proves that the polyhouse techniques can held 4 to 10 times more yielding than the normal method of farming techniques. Mostly the polyhouse is constructed in east to west direction in order to allow proper entry of sun light in polyhouse farming, we can protect our crops from any adverse environment such as high humidity or high temperature. There is a facility in polyhouse to control temperature or humidity.

II. LITERATURE SURVEY

Automation in Polyhouse is latest method in farming. With the help of poly house we are able to create fake as well as comfortable environment for the crop. This method helps to get more crop than the regular methods and it's more organic. Automation in polyhouse avoids the unnecessary errors by the farmer. We are monitoring the temperature, humidity, soil moisture, intensity of light inside polyhouse farm using different sensors. The whole farm is controlled using arduino. The whole polyhouse is monitored by the mobile application which is connected to internet. [1]

Polyhouse is a method used to grow crop under controlled environment for increasing output and better quality of crops. The growth and development of crop depends upon internal condition of polyhouse such as humidity and temperature. The controlling and monitoring of polyhouse sensors play role in overall growth of plant. This tends replacement of the human by automation. Light is the most important source for photosynthesis and the light intensity is also monitored. [2]

Main aim of this project is to monitor the crops by operating the temperature, humidity, moisture. Also monitor the decease using camera and receive and send signals using internet of things. Temperature sensor senses the temperature and it is obtained in form of analog signal. The moisture and humidity sensor values are also obtained. The status of entire operation can be known with the help of internet of things. [3]

Polyhouse is latest technology relates to farming technology. Polyhouse is emerging organic business in developed countries. It is creating comfortable environment for crop. With the help of this method more crop yields than normal methods where it is more organic. Whole farm is controlled with help of arduino. The farm is monitor using the mobile app which is connected to internet. Arduino is connected to IOT WIFI module which sends output from sensors to cloud. [4]

System given in the paper is based on the internet of things (IOT), it is cloud of interconnected physical devices which are use to communicate with each other with help of internet. Physical devices such as microcontrollers, microprocessor, actuators and sensors unable to directly communicate with internet, hence IOT used as a getway. This entire infrastructure known as IOT infrastructure. [5]

Polyhouse is bulding like structure where plants are grown which are usually used for growing flowers, fruits, vegetables, fruits and tobacco plants. Basic factor which important for plant growth is sunlight and water content in soil, temperature, etc. a graphical user interface (GUI) is used for the ease of operation by farming community. [6]

North Eastern Hill (NEH) is the region consists of eight states of india. Where as in this region mainly vegetables crops are yield by farmers. Where in this region high rainfall, hail storms, lower temperature, etc. such problems occurs. Hence necessity of polyhouse at such places is increases and hence automation in polyhouse will definitely be helpful for that region. [7]

According to monitoring and management needs the modern green house, this modern greenhouse intelligent monitoring system is based on the internet of things. The system is consist of these local monitoring subsystem, remote monitoring subsystem and the data base. Local monitoring subsystem is developing under construction of server. That of remote monitoring system where developed under browser and the database is used as bridge between them. [8]

Control of temperature and relative humidity inside a poly house can also be done with help of microcontroller. In such method, green house controller sences change in temperature and relative humidity with the help of the different sensors. And process output takes the required action. Such system is low cost, user friendly as well as it having high stability and reliability. [9]

In modern green houses, different measurements are conducted to tress down the local climate parameters in different of big green house cabling makes this system costliest and time consuming hence, wireless sensor network (WSN) is used which is small to relocate and easy to operate. Which consist of different sensors and its costing is also efficient. [10]

III. SYSTEM ANALYSIS

A. Block/Circuit diagram of proposed system -

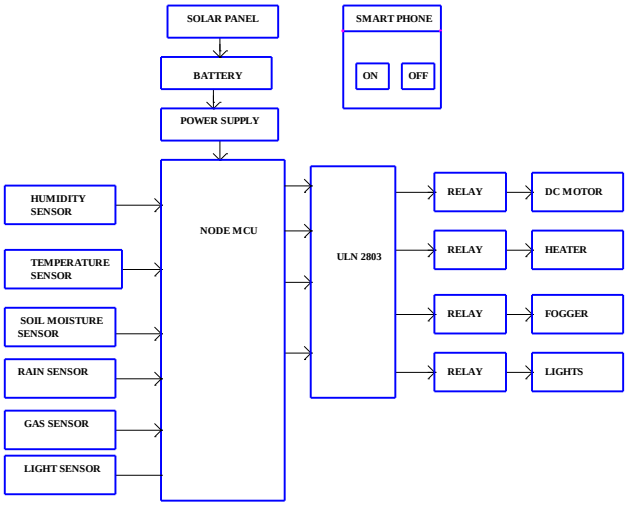

Figure 1: Block Diagram of Polyhouse

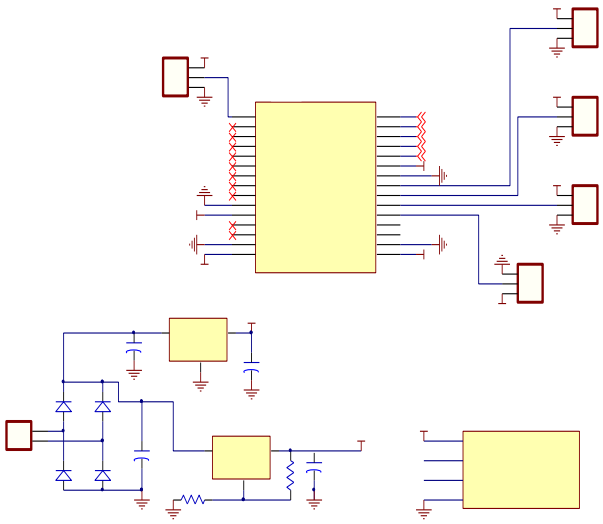

Figure 2: Circuit Diagram of Polyhouse

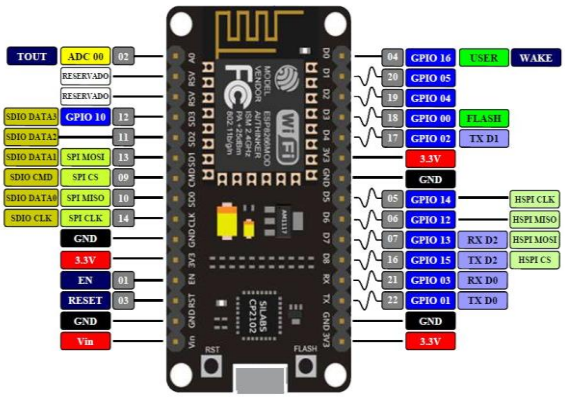

Figure 3: Node MCU

B. Components of Polyhouse -

i). Node MCU: Node MCU is an open source IOT platform. It includes firmware which runs on the ESP8266 Wi-Fi SOC from Espress if Systems, and hardware which is based on the ESP-12 module. The term "Node MCU" by default refers to the firmware rather than the dev kits. It's having 128KBytes of memory and its storage space is 4Mbytes and power is supplied through an USB and it is a single board microcontroller and also it is having 16 GPIO pins.

Figure 4: WIFI Module

ii). WIFI Module: Wi-Fi is a technology for wireless local area networking with devices based on the IEEE 802.11 standards. There are lots of WiFi Features which make it more easy and simple wireless network. Wi-Fi Technology is, in spirit, a version of Ethernet without wires in the form of a wireless local area network. Now days millions of people using this built in feature amazing wireless technology.

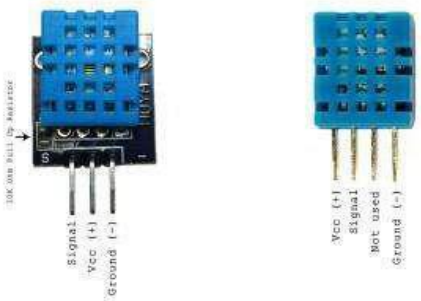

Figure 5: Humidity sensor

iii). Humidity sensor: Because of their low cost and small size, DHT11 humidity and temperature sensors are perfect for lots of different DIY electronics projects. Some projects where the DHT11 would be useful include remote weather stations, home environment control systems, and agricultural/garden monitoring systems. DHT11 digital temperature and humidity sensor is a composite Sensor contains a calibrated digital signal output of the temperature and humidity.

Figure 6: Temperature sensor

iv). Temperature sensor: The LM35-series devices are precision integrated-circuit temperature sensors, with an output voltage linearly proportional to the Centigrade temperature. The LM35 device has an advantage over linear temperature sensors calibrated in Kelvin, The LM35 device does not require any external calibration or trimming to provide typical accuracies of ± ¼ °C at room temperature and ± ¾ °C over a full −55°C to 150°C temperature range.

v). Light Sensor: The intensity of light in the polyhouse is measured through the Light sensor. Light sensor is the device which is used to detect the current ambient level of the light i.e. how bright or dark it is. The sensor used is INVNT_10 Lm393 optical photosensitive LDR light sensitive sensor.

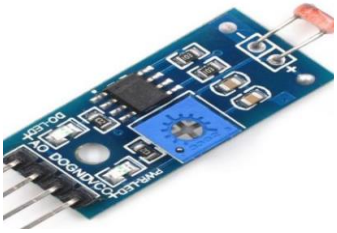
Figure 7: Light sensor

vi). Soil moisture sensor: Soil moisture sensor is the device which measures the content of water in the soil. Soil moisture measurement is important to help farmers manage their irrigation systems. It consists of two probes which are used to measure the volumetric content of water. When there is more water, the soil will conduct more electricity which means that there will be less resistance. Therefore, the moisture level

will be higher so when there will be less water, then the soil will conduct less electricity which means that there will be more resistance. Therefore, the moisture level will be lower.

vii). Relay: The Single Pole Double Throw SPDT relay is quite useful in certain applications because of its internal configuration. It has one common terminal and 2 contacts in 2 different configurations: one can be Normally Closed and the other one is opened or it can be Normally Open and the other one closed. So basically you can see the SPDT relay as a way of switching between 2 circuits: when there is no voltage applied to the coil one circuit "receives" current, the other one doesn't and when the coil gets energized the opposite is happening.

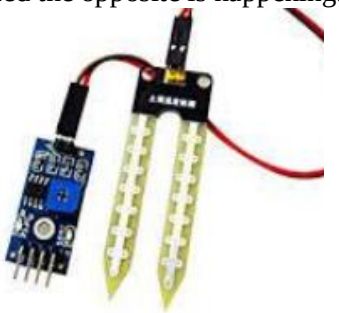

Figure 8: soil moisture sensor

Figure 9: Relay board

viii). ULN 2083: The eight NPN Darlington connected transistors in this family of arrays are ideally suited for interfacing between low logic level digital circuitry (such as TTL, CMOS or PMOS/NMOS) and the higher current/voltage requirements of lamps, relays, printer hammers or other similar loads for a broad range of computer, industrial, and consumer applications. All devices feature open–collector outputs and freewheeling clamp diodes for transient suppression. The ULN2803 is designed to be compatible with standard TTL families while the ULN2804 is optimized for 6 to 15 volt high level CMOS or PMOS.

Figure 10: IC ULN 2083

IV. CONCLUSION

Automation in polyhouse is highly useful for farmers as they don't have to monitor the conditions inside the polyhouse physically and take the required steps. Polyhouse is a solution for lack of agricultural lands. We can get more crops from less space in Polyhouse farming. The system will monitor the conditions and take the respective steps required to maintain the threshold conditions inside the polyhouse. Rainwater Harvesting also ensures that rainwater is used for irrigation inside the polyhouse. The temperature, humidity, light intensity are measured and controlled. The lab View is used as the monitoring system for the controlling of the poly house. It has been interfaced with Node MCU. Thus the poly house has been automated.

V. REFERENCES

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