AUTOMATED GREENHOUSE

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Abstract— **Monitoring and control of greenhouse environment play an important role in greenhouse production and management. To monitor the greenhouse environment parameters effectively, it is necessary to design a measurement and control system. The objective of this project is to design a simple, easy to install, microcontroller-based circuit to monitor and record the values of temperature, humidity, soil moisture and light intensity, soil PH of the natural environment that are continuously modified and controlled in order optimize them to achieve maximum plant growth and yield. The controller used is a low power, cost efficient it manufactured by ATMEL which is 89S51. It communicates with the various sensor modules in real-time in order to control the light, aeration and drainage process efficiently inside a greenhouse by actuating a cooler (fans),**

Sprayer, dripper and lights respectively according to the necessary condition of the crops. An integrated Liquid crystal display (LCD) is also used for real time display of data acquired from the various sensors and the status of the various devices. Also, the use of easily available components reduces the manufacturing and maintenance costs. The design is quite flexible as the software can be changed any time. It can thus be tailor-made to the specific requirements of the user. This makes the proposed system to be an economical, portable and a low maintenance solution for greenhouse applications, especially in rural areas and for small scale agriculture.

Index Terms— **Monitoring, greenhouse.**
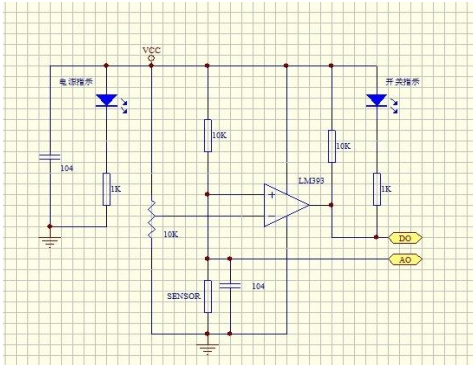
I. INTRODUCTION

Greenhouse is an exceptionally outlined homestead structure building to give a more controllable environment to better harvest generation, crop security, product seeding and transplanting. Also, the accessible space of area for developing yields has been altogether diminishing; following to more space of area is vigorously utilized for housing and commercial ventures as a part of this present day period. In most tropical nations, the utilization of greenhouse has been developed for cost effective farming i.e. organic products, new blossoms and vegetables generation. The effectiveness of plant creation inside greenhouse depends fundamentally on the conformity of ideal atmosphere development conditions to attain to high return at low cost, great quality and low natural burden. To

attain to these objectives a few parameters, for example, light, temperature and humidity, soil moisture must be controlled ideally given certain criteria through warming, lighting, ventilation and water creation. Persistent checking and controlling of these ecological variables gives significant data relating to the individual impacts of the different elements towards acquiring most extreme harvest creation. Greenhouse situations present remarkable difficulties to great control. Temperature changes happen quickly and fluctuate broadly relying upon sun powered radiation levels, outside temperatures and moistness levels in the greenhouse. Poor light intensity and high stickiness frequently bring about poor natural product set and quality. More exact control can decrease heating fuel and electrical expenses, expand the efficiency of laborers by empowering them to go to more important assignments, empowering directors and producers to settle on better administration choices and invest more energy dealing with the procedure.

climatic conditions, this exploration has the reason for making relationship between sensors flags and reference estimations, breaking down the development, advancement of yields and the natural variables to which they are uncovered. Moreover, control programming will give information procurement and control, genuine time graphical show, dates and time labels the data and stores it for present or later utilize. Also, by consistently observing various natural variables without a moment's delay, an agriculturist has the capacity see how development conditions are fluctuating, and respond to those progressions with specific end goal and effectiveness

II. OBJECTIVE OF PROJECT

We live in our current reality where everything can be controlled and worked naturally, however there are still a couple of vital segments in our nation where computerization has not been received or not been put to an incontestable utilization, maybe in dainty of a few reasons one such reason is expense. One such field is that of agricultural. Agricultural has been one of the essential occupations of man subsequent to right on time developments and even today manual interventions in cultivating are certain. Greenhouse control system an imperative piece of the agribusiness and agriculture areas in our nation as they can be utilized to develop plants under controlled climatic conditions for ideal produce. An automated system inside a greenhouse visualizes checking and controlling of the climatic parameters which specifically or in an indirect way administer the plant development and

consequently their produce. Automation is methodology control of automated hardware and courses of action, subsequently supplanting human proprietor.

Block diagram consist of following blocks
- SENSORS
- ADC
- MICROCONTROLLER (AT89S51)
- LCD
- POWER SUPPLY
- RELAYS
- OUTPUT DEVICES

III. SENSORS:

A. TEMPERTURE SENSOR(LM35):

In our project we are using LM35 as temprture sensor. The sensitivity LM35 is 10mv/0C, and cost is RS. 30/- only. The thing in LM35 is the output of LM35 is directly in the terms of measurabl voltage range . there no need to use whetstone bridge and the instrumentation amlpifier there for the circuit complexity as well as the cost of hardware reduced by using L35 temperture sensor.

B. light sensor (LDR)

In ur project we are using the LDR as the dark sensor. we are utilizing this property of LDR to at as the senssor since the varrying voltage drop can be obtain with a varring light . In this circuit the amount of light is varry because of the shadow of the visitor falls on LDR. So care should be taken while mounting the LDR .

C. Humidity sensor(SY-HS-220)

Humidity I the amount of water vapor in the air in daily language the term "humidity" is normally taken to mean the relative humidity . relative humidity is defined as the ratio of partial pressure of water vapor in partial of air to the saturated vapor pressure of water vapor at a prescibed .humidity may also expressed as absulute humidity and specific humidity relative humidity is an important matric usedin forcasting wheather. Humidity indiacates the likelihood of precipitation ,dew or fog. High humidity makes people feel hotter outside in the summer because it reduces the effectiveness of sweating to cool body but preenting the evaporation of purspiration from the skin this effect is calculated in a heat index table this sensr is available in martket for RS. 607/-, its bit costly

D. Soil Moisture Sensor (LM393)

This sensor can be used to test the moisture of soil,when the soi is having water shortage,the module output is at High level,else the ouput is at low level. By using this sensorone can automatically water the flower plant,or any other plants requiring automatic watering tecniqe. Module triple output mode,Digital output is simple,along output more acurate,serial output with exact readings.

E. PH Sensor (TL082)

PH sensor is a sensor which is used to measure a PH of soil for this purpose we can use a op-amp TL082 (TL082 dual JFET input IC)
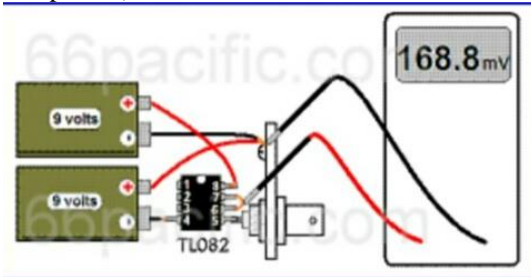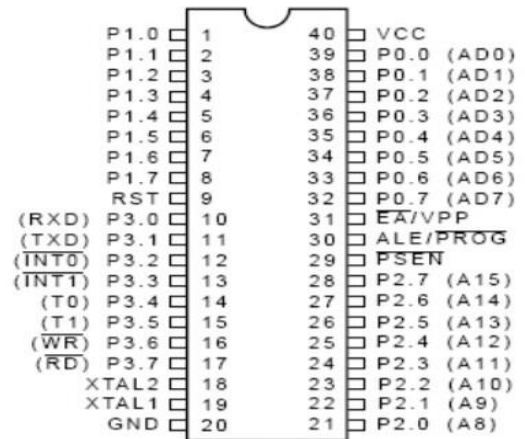

Above shows the phisical layout of the meter a digital voltmeter is connected to ground and pin.6 and 7 of the op-amp which are shorted together . In this circuit the pins.1,2,3 of the IC ar not used.

## IV. ADC(ANALOG TO DIGITAL CONVERTER 0808):
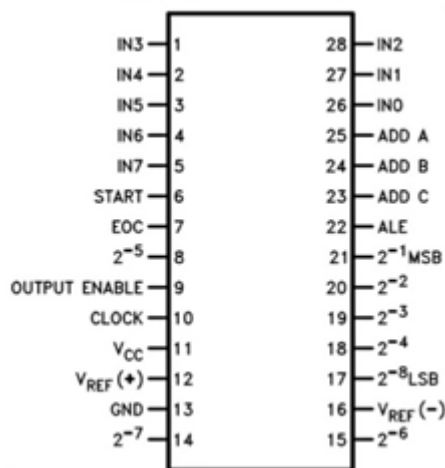
The analog to digital coverter is the device used to convert the analog signal into digital signal . In our project we are using the ADC to convert the data which is sensed by the sensor ie. Temperture, humidity,moisture,light, ph. Those values sensed by the sensor are given to the ADC IC than its convert that data into digitl form and give to the microcontroller

A. Microcontroller(AT89S51):

The microcontroller is main part of the project . that cotrol all operation of monitoring and controlling the greenhouse . the microcontroller which we are using is AT89S51 .In market this microcontroller available in RS.48/- only ,so this chip and reduce cost of our project .

PIN DIAGRAM OF AT89C51

B. LCD(16*8):

We are using the LCD disply in our project. The main fuction of LCD in this project is to monitoring the parameters which are sensed by the the sensors ie.temperture, humidity, light intensity , ph of soil and moisture
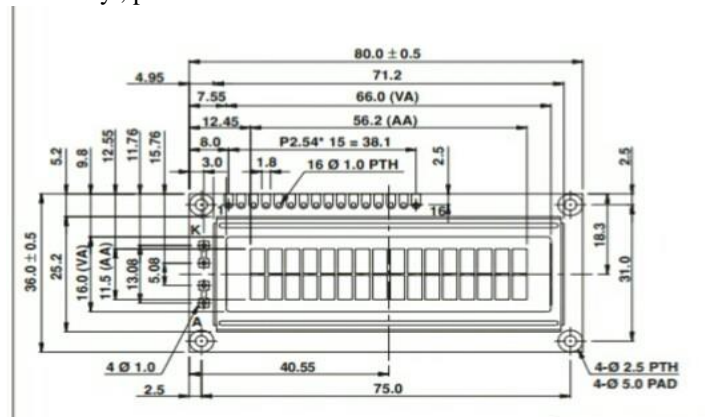
C. RELAYS:

we are using 12v relays in   project . the all output controlling devices are connected to the microcontroller using the relays .This 12v relays are available in market for RS.25, its also chip in price .

V. OUTPUT DEVICES:

The output devices are also called as a controlling devices in this project. This controllig devices are connected to microcontroller through 12V relays . In this controlling devices we are using the fan for cooling , bulb for heating or as heater, small LEDs for light , sprinkler for humidity control and water bump for the moisture control of soil.

A. Power suppy:

The power suppy is devided into two part one is 12V for relays and 5V as VCC other circuits
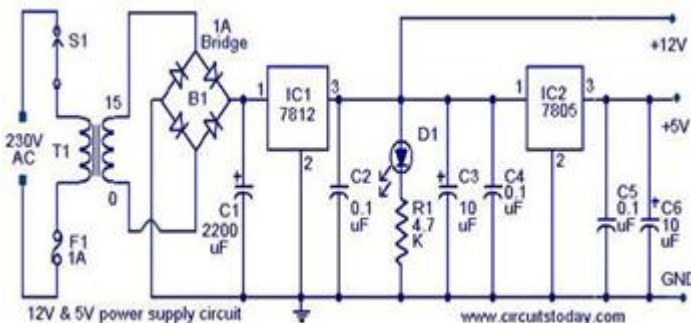
VI. WORKING OF PROJECT

This project is basically controlling and monitoring of the greenhouse .we devided this project in the two parts which are following:

Monitoring: In this project sensir are there to take a readings of the some parameter like temperture,humidity,moisure of soil ans ph and light intensity thise reading are given to the ADC IC than those values of parameter are converted into the hex form and given ti microcontroller .than we had interfaced the LCD display with the microontroller to indicate the vales which are sensed by the sensors .in this way the monitoring of the greenhouse environment parameter are shown on the LCD

controlling : In controlling we are using the controlling devices which are connected to microcontroller throgh the realys . at the start while programming we program the microcontroller in a such a way that when external parameters cross the thredshold value which is programmed ,than microcontroller on the repective relay and that cause the switching that device ON. Example: if temperture crossed the thrshold value which we had programmed than microcontroller will give signal to the relay in which the Fan is connncted so,Fan will turn ON and try to balance the temperture.likewise the bulb we are using as a heater when the temperture is decreased ,the sprayer is used to maintain the humidity , the water pump is also used to maintain the moisture of soil from which the water will enter in greenhpuse plant ,we also using the LEDs for maintain the light for the crops .

In this way this greenhouse monitoring and controlling project works.

Working of water controlling system

VII. WATER CONTROLLING SYSTEM:

It contains water pumps , water level sensor , water storage etc.

Its used to provide water to controlling system

This system fills the water storage when water level very low.

VIII. EXPECTED OUTPUTS :

In this project the output are depended upon the greenhouse environment parameters.

Ie. Temperture,humidity,light,soil moisure and soil PH.

A. Conditions for the outputs:

1.when temperture is greater than threshold the FAN will in ON condition

2. When temperture is less than the threshold than bulb will e ON it works as the heater

3. When humidity is greater than threshold the sprinkler will be in ON condition

4. When the moisture of soil is less than minimum value than water pumpwill be in ON condition

5. When the light intensty of the greenhuse is low the LEDs will be in ON condition

And main opuput is all those parameter values should be indicated on the LCD display

This are the expectede outputs of this project

IX. ADVANTAGES:

1. Cost is very less .
2. easy to carry .
3. The main advantage is while using this system very less manual and labor power is needed , all operations are automated .

4. According to the requirement , we can easily change some values in program and use this system for different crops and plant .

X. DISADVANTAGES:

The suppies are givens thrugh the the wire so while loadsheding problem circuit will be in OFF condition .

Solution: we can use the rechargable batteries so we can easily charge it and use for long time and even in loadsheding problem the circuit will work nicely.

APPLICATIONS:

1. It is used to monitor and the controlling of green house
2. By increasing more amount of sensor and output devices we can monitor and control more parameters
3. It is used in medical factaries by changing the type of sensers and output devices.

FUTURE SCOPE:

We can interfae more sensors to improve the system.

We can interface GSM module to send the environment report(time to time update) of green house to owner.

CONCLUSION

1) This project is for greenhouse environment controlling and monitoring .
2) So by using this system with microcontroller AT89S51 the system works neatly and control, monitor environment parameters frequently.
3) Even by using this system there is no manual or labor power not needed .
4) This project is find application domestic agricultural field.