# GREEN HOUSE MONITORING AND CONTROLLING USING BASED IOT

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**Abstract-** In Order to implement an IOT based plant growth is developed to monitoring and controlling the microclimatic environment inside a green house. Greenhouse environmental control system owe to the interaction of many environmental variables affecting growth and production. Using IOT, soilmoiseture, Humidity and Temperature Sensor value are known from the greenhouse. Set predefined threshold values for each sensor, depending on sensor reading to controller will activate Water sprayer, cooling fan, Rooftop and Focus Light for maximum plant growth. The Internet Of Things (IOT) is the most encouraging innovation in horticultural applications Which comprises of consistent of gadgets associated with screen and control the farming parameters. The detected information can be checked and the yield gadgets can be controlled utilizing IOT.

Keywords: GSM, SMS, GUI, SRAM.

## I. INTRODUCTION:

In this paper, the Design had been aimed data acquisition in green house for multiple sensors to use data for simulation or processing to achieve the better enhancement of growth in greenhouse, this data has effect on the climate of greenhouse. Graphical User Interfaces (GUI) had been used through LabVIEW, firmware of arduino as software and arduino board and sensors as hardware. By using arduino mega board provides multiple inputs analog I/O digitals to made read data sensor easy to take temperature, humidity, CO2 gas, also measuring the soil moisture that needed for irrigation plants and the intensity of lights that applied for greenhouse . These factors have the major effect on increase in growth of plants. Greenhouse environments monitoring different changes to parameters, the system for this purpose had been provided and given ability to control on climate of greenhouse. The crop agriculture in greenhouse is higher affected by the surrounding conditions. The significant environmental factors for the quality and better productivity of the plants growth are temperature, relative humidity, Lighting, moisture soil, and the CO2 amount in green house. Continuous monitoring of these factors gives relevant information pertaining to the individual effects of the various factors towards obtaining maximum crop production. Arduino is an open-source electronics prototyping platform based on flexible, easy-to-use hardware and software. It's intended for artists, designers, hobbyists, and anyone interested in creating interactive objects or environments. Arduino can sense the surroundings by receiving input signal from a variety of sensors and can affect its environment via controlling heater, Water pump, and other actuators.

The AVR Atmega2560 on the board is programmed using the Arduino programming language (depended on Wiring) and the Arduino-development Environment (depended-on processing). Arduino projects can be stand-alone or they can communicate with software running on a computer (e.g. Flash,

Processing, MaxMSP) A greenhouse is seen as a multivariable process presents a nonlinear nature and is influenced by biological processes. The five most important parameters must be taken into consideration when design a green house is temperature, relative humidity, ground water, illumination intensity and CO2 concentration.

This parameters is important to realize that the five parameters mentioned above are non linear and extremely inter -dependent. The computer control system for the green house *involves the series steps:*
1. Acquisition of data through sensors.
2. Processing of data, comparing it with desired states and finally deciding what must be done to change the state of system.
3. Actuation component carrying the necessary action.
This paper describes a solution to the first part of the system. The information is obtained from multi-sensors station and is transmitted through USB port to computer.

## II. RELATED WORK

This project describes the design of a greenhouse monitoring & controlling system based on IOT using Arduino. Some of the previous systems used android phone to monitor the green house but lacked to control it using android from remote locations. One of them was based on Global System for Mobile Communications (GSM) in which notifications are sent via SMS, but disadvantage of this system was every time user had to type commands which was time consuming and costly. The biggest disadvantage of these systems was that one person always had to be present in the green house or in the vicinity of the green house. The first problem which is overcome in our system is that a person need not always be present in the greenhouse. Plants in green house are grown under controlled environment. The temperature differences can cause harm to plants. Sometimes the farmers cannot predict which action needs to be taken so to control the environment and may take wrong decisions thus causing more harm to the plants in the green house. Our system will allow him to take proper decisions by providing the status of the sensors to the farmer with accurate information through the IOT web server. Thus this system helps farmer to control green house from remote locations.

## III. THEORY

*A.Arduino UNO*

The arduino Uno is a microcontroller board based on the ATmega328. It has 14 digital input/output pins, 6 analog vinput, a 16 MHZ crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. The Uno differ from all proceeding boards in that it does not use the FTDI USB to serial driver chip.”UNO” means one in Italian and is named to mark the upcoming release of arduino 1.0.The Uno is the latest in a series of USB Arduino boards and reference model for Arduino platform. The Arduino Uno can power via the USB connection or with external power supply. External power can come either from an AC to DC adapter or battery. The board can operate on an external supply of 6 to 20 volts. If supply with less than 7v, however, the 5v pin may supply less than five volts and the board maybe unstable. The Ttmega328 has 32 KB of flash memory for storing code. It has also 2KB of SRAM and 1KB of EEPROM. The Arduino software includes a serial monitor which allows simple textual data to be send to and from the Arduino board, The RX and TX LEDs on the board will flash when data is being transmitted via the USB to serial chip and USB connection to the computer. A Software Serial library allows for serial communication on any of the UNO’s digital pins, the arduino software includes a wire library to simplify use of the I2C bus. Arduino is open source hardware and software, which are license under theGNU lesser General public license, which is permitting the manufacture of Arduino board and software distribution by anyone

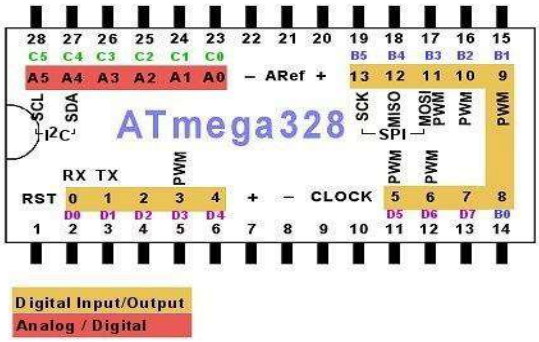


***Figure 1: Pinout of ATmega 328***

The Arduino are programmed using a dialect of feature from programming language C and C++. In addition tousing traditional compiler tool chains, the Arduino provide integrated development environment (IDE) based on processing language project.

*B. Atmospheric Sensor's*

*i) Soil Moisture Sensor:*

The two copper leads act as the sensor probes. They areimmersed into the specimen soil whose moisture contentisunder test. The conductivity of soil depends upon the amountof moisture present in it. It increases with increase in thewater content of the soil that forms a conductive pathbetween two sensor probes leading to a close path to allowcurrent flowing through.

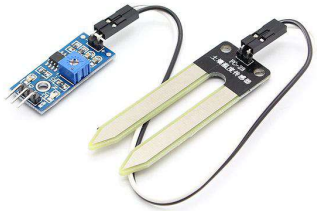

***Figure 2: Soil Moisture Sensor***

*ii) Light Sensor (LDR):*

The light sensor is extremely sensitive in visible light range. With the light sensor attached to the system when the surrounding natural lights are low, it displays the digital values.

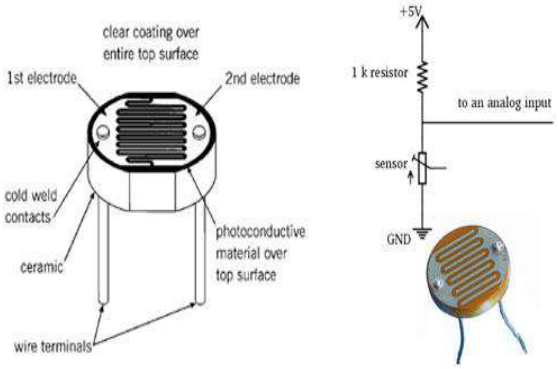


***Figure 3: LDR sensor***

*iii) Humidity Sensor (DHT11)*

Humidity sensor is used for sensing the vapours in the air.The change in RH (Relative Humidity) of the ssurroundingswould result in display of values.

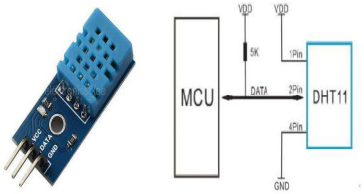


***Figure 4: DHT11 Sensor***

iv) Temperature Sensor ( LM35):

If the temp exceeds beyond the limit set then a fan will be automatically switched ON as a coolant to reduce the temperature.When it reaches the desired temp the fan will be switched OFF automatically with the help of a relay. But if the temp decreases bellow the optimum temp a bulb as a heater will be switched ON to set the temp within the desired range.

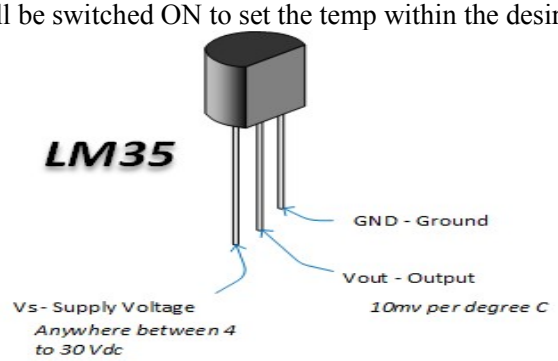


***Figure 5: LM35 Sensor***

## IV. SIGNIFICANCE AND SCOPE

Automatically control environmental conditions withingreenhouse allowing any type of plants to be grown all yearround.Eliminates risk of greenhouse not being maintained atspecific environmental conditions due to human error. Minimize labor costs involved in maintaining a green house. A customer able to define specific green house conditions. “Plug-And-Play” product. This project describes the design of a greenhouse monitoring& controlling system based on IOT using Arduino. Agriculture projects even in urban areas are on a rise inrecent times, in unique forms technological progress makes the agricultural sector grow high, Which here is made by theIOT. The IOT will dramatically change the way we live ourdaily lives & what information is stored about us. Thecomputing is free to use anytime from the cloud andanywhere as long as the computer is connected with theinternet. This monitoring &controlling system preceptsdifferent parameters inside the greenhouse using sensors, GSM & IOT to provide the updates. The developedsystem can be proved profitable as it will optimize theresources in the greenhouse. The complete module is of lowcost, low power operation hence, easily available toeveryone.

## V. PROPOSED METHODOLOGY

The basic block diagram of greenhouse system is as shown infig .6. An Arduino platform micro-controller is used to obtain values of physical data through sensors connected to it. And then sensor’s collected data is given to GPRS module.

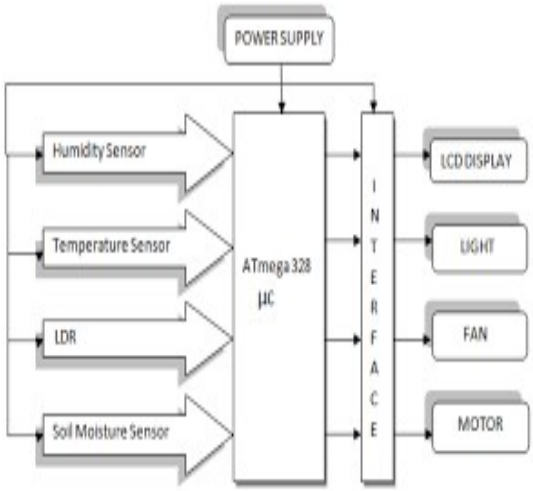


***Figure 6: Block diagram***

*A. Mechanism*

- ✓ An arduino based Greenhouse Automation is designed.
- ✓ The arduino can be programmed with arduino software (IDE).
- ✓ Internet Of Things concept is used for showing the sensed data on web portal page.

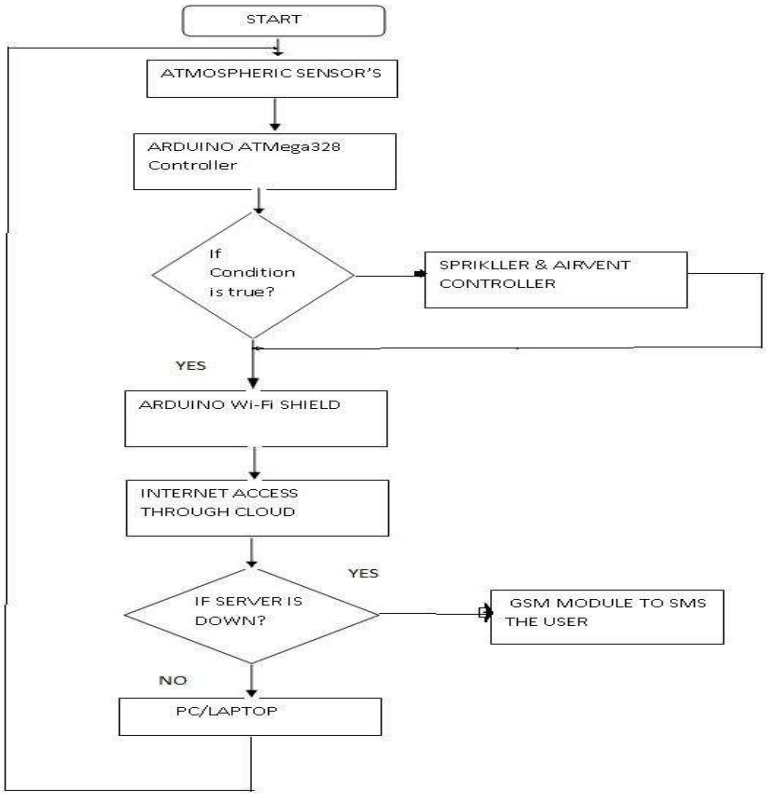


***Figure 7: Flow chart***

## VI. EXPERIMENTAL RESULTS

In this proposed system we have used atmospheric sensor's,which is LDR light sensor, LM35 temperature, DHT11humidity sensor. For these sensor's we have denoted somespecific conditions or the threshold values .As per theirclimate the value will be change and the controlling actionwill be taken by relays which is connected to the output side.And the changed data of atmospheric sensor's we canobserved for analyzing on the screen of serial monitoring using the arduino uno kit and their IDE software.Thehardware of proposed system and status of the sensor's.

*A. Advantages*

- Total automation of greenhouses / nurseries / bio tech parks.
- Can be used domestically.
- Easy to use, install, operate & troubleshoot.
- Useful for small scale farmers &green house owners.
- Low cost setup.

## V. CONCLUSION

Here, proposed design is implemented with Arduino platform for greenhouse monitoring and controlling temperature and soil moisture with the help of Web server using IOT.

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