# Remote Sensing and Controlling of Greenhouse Agriculture Parameters based on Internet of Things

**A. A. Daptardar[1], S. G. Gollagi[2], Anuja Patil[3], Yuvaraj Patil[4], Somnath Naik koli[5]**
**Asst. Prof.[1,2], Student[3,4,5]**
**Department of Computer Science and Engineering**
**Hirasugar Institute of Technology, Nidasoshi**

## ABSTRACT

The new era in computer communication is Internet of Things (IoT), gaining its importance because of wide variety of application in oriented project developments. The IoT has essentially increased the remote distance control and variety of interconnected things or devices. The IoT includes the hardware and internet connection to the real time application. The main components of IoT are sensors, actuators, embedded system and internet connection. The paper proposed a remote sensing of agriculture parameters and control system to the greenhouse agriculture. The plan is to control smoke gas, soil moisture, temperature and light. The objective is to increase the yield and to provide organic farming.

**Keywords: IoT, green house, smoke gas, soil moisture, sensors, etc.**

## I. INTRODUCTION

Developing plants has turned out to be innovative test in light of the fact that the field and strength of the plants are vital parameter now a day's either for cash crops or food crops. One of the significant issues in the present agriculture is the less learning of the agriculture parameters, and less information about the developing innovations.

Presently the advancement of precision agriculture in green house, for plant development has turned out to be prominent on account of less cost innovations for the agriculturists to re-arrive yield. The greenhouse is a house like a structure covered with a transparent material, which can keep up controlled temperature, required moistness level, light infiltration and so on, for the healthy plant growth.

## II. EXISTING SYSTEM

In the past agribusiness structure our people of old avoid the use of a specific development for specific plant growth, they rather used regular marvel for all plants. The technological change in the agriculture can develop plants under uncommon normal natural conditions, and also develops specific plants under specific condition which in turn help to get more yield and less compost.

The précised agriculture framework going towards its improvement, in light of the innovative progression in Wireless Sensor Networks (WSN) that is nothing but an IoT. The irregular climate conditions for the plants in greenhouse will influence the development of the plants, and less yield toward the end of the cultivation. So, that it is necessary to control and monitor the greenhouse parameters, for example, $CO_2$, soil moisture, temperature, light and so on.

This issue can be solved by adapting an IoT innovation in precision agriculture, which incorporates the précised application for particular greenhouse parameters, for instance controlled temperature range, water flow control, light radiation and so on for the good plant growth[8].

## III. PROPOSED WORK

The proposed system, interested to help the farmer by introducing IoT based precision agriculture system for greenhouse. Our focus is to provide field information that is remotely controlled greenhouse agriculture parameters such as $CO_2$, temperature, and light, to the farmers from long distance[8]. This avoids the farmers from physical visit to the fields. For this we used a IoT kit with internet connection. The components used are IoT kit, Sensors, Internet connection, DC motor driver circuit, Relay logic circuit, Cloud account, End user.

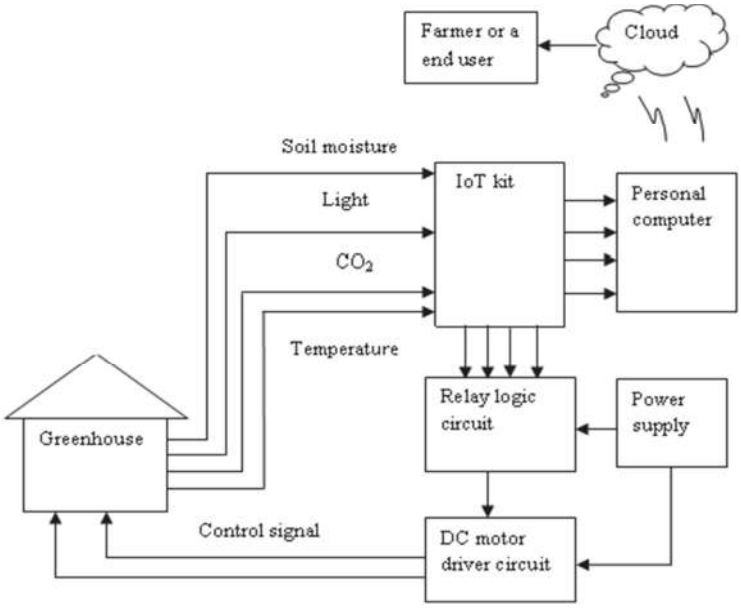


**Fig. 1. System Architecture[8]**

# IV. REQUIREMENTS

## A.SENSORS:

- **SOIL MOISTURE SENSOR**

This Moisture Sensor can be used to detect the moisture of soil or judge if there is water around the sensor, let the plants in your garden reach out for human help. They can be very easy to use, just insert it into the soil and then read it. With the help of this sensor, it will be realizable to make the plant remind you[13].

- **LIGHT SENSOR (LDR)**

A Light Dependent Resistor (LDR) or a photo resistor is a device whose resistivity is a function of the incident electromagnetic radiation. Hence, they are light sensitive devices. They are also called as photo conductors, photo conductive cells or simply photocells[13].

- **TEMPERATURE SENSORS (DHT11)**

The DHT11 is a basic, ultra low-cost digital temperature and humidity sensor. It uses a capacitive humidity sensor and a thermistor to measure the surrounding air, and spits out a digital signal on the data pin (no analog input pins needed)[13].

- **SMOKE SENSOR(CO)**

A Carbon Monoxide Detector for the Arduino-based DIY security system. The carbon monoxide detector is a semiconductor gas sensor tuned to detect carbon monoxide[13].

- **Wi-Fi Module (ESP8266)**

It connects the sensor and Arduino UNO with the internet to mobile application. It updates the weather information on the both side, updates the thinkspeak server and the also update information in database. We are using ESP8266 to connect our Arduino UNO server[13].

- **GSM MODULE**

This is a GSM/GPRS-compatible Quad-band cell phone, which works on a frequency of 850/900/1800/1900MHz and which can be used not only to access the Internet, but also for oral communication (provided that it is connected to a microphone and a small loud speaker) and for SMSs[13].

- **ARDUINO UNO**

Arduino is an open source computer hardware and software company, project, and user community that designs and manufactures single-board microcontrollers and microcontroller kits for building digital devices and interactive objects that can sense and control objects in the physical and digital world[13].

## V. WORKING

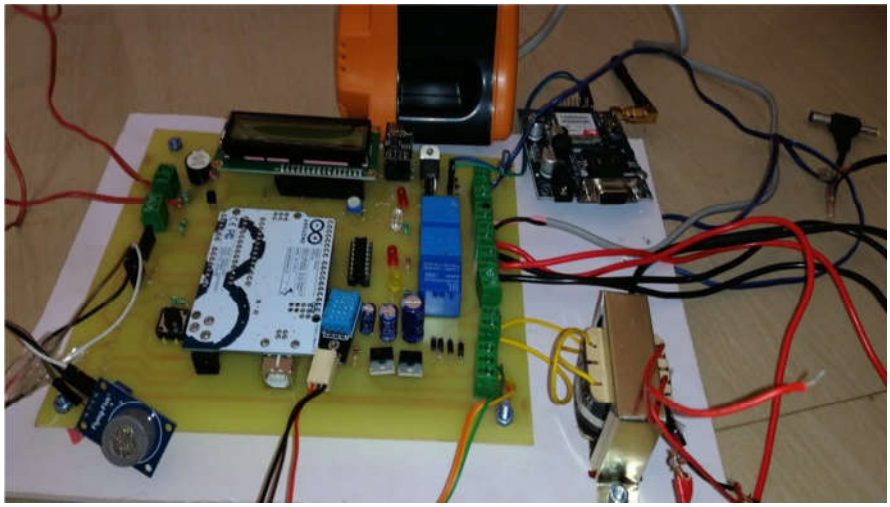

**Fig.2. Model design**

In the proposed conspire, there is an analysis for the execution parameters of greenhouse, for example, CO, soil moisture, temperature, and light for bell pepper plant with practical outcomes by utilizing IoT kit.

The plant photosynthesis process required a most extreme measure of CO concentration level and water around evening time contrasting with day time; with the assistance of these two energies, the photosynthesis procedure keeps the plant cool and aides in quick development of the plants.

After conducting an experiment for the CO concentration level in green house, maintained a CO level maximum at night time because from day time the greenhouse start to consume CO level till night time. So, the CO level at day time is less.

Water content in the soil is important factor because for the plant, excess of water can produce a fungal infection at the same time plants with less water becomes dry or sometimes they may get damage.

So, the required level of water to the plant is very much essential. At, night time plants require a more water with $CO_2$ for photosynthesis process. In IoT kit the soil moisture sensor gives a negative value it means the full of water is covered by the plants at that time the greenhouse windows/doors will be closed automatically with the help of DC motor. The positive value indicates the dryness of the soil. So need to re-wet the soil

The temperature is also a one of the important parameter in greenhouse; the temperature should be maintained maximum. Because, the temperature helps in flowering, fruits, photosynthesis, seed germination, etc.

Therefore in greenhouse maintained a maximum amount of temperature range, compared to outside greenhouse environment temperature range. The different colors of sun light are useful in photosynthesis process, which is present in the green part of the plants used for plant growth, flowering, and shape of the plant.

Thus, maintained a sustainable amount of light penetration inside the greenhouse, compared to normal light penetration outside of the greenhouse.

## VI. Results

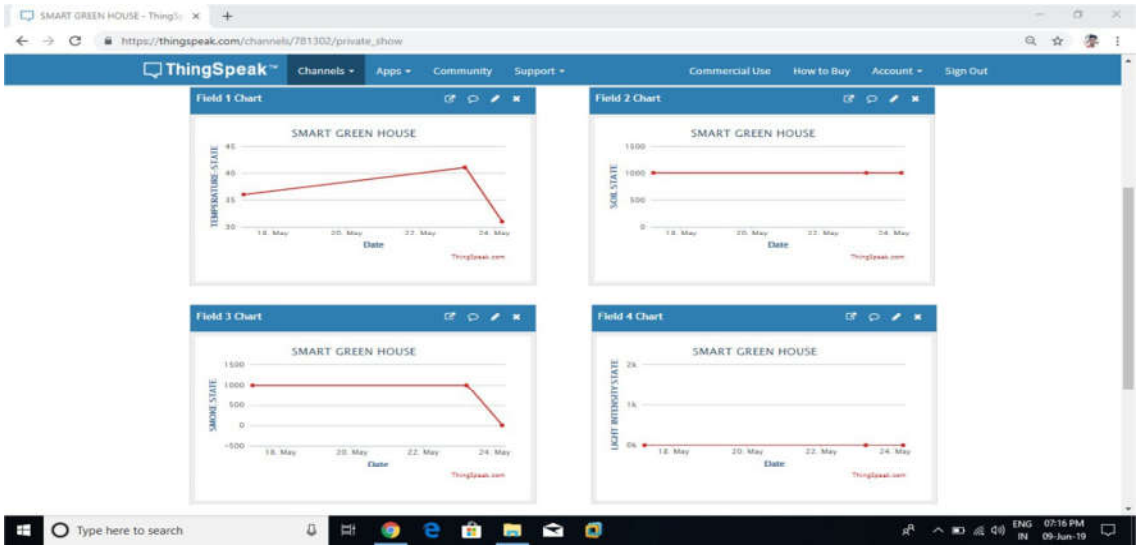


**Fig.4. GSM Messages**

## CONCLUSION

The system is designed to remotely monitor the greenhouse parameters such as $CO_2$, soil moisture, temperature, and light, this information can be collected by the farmers with the help of cloud account and internet connection. There is also controlling action taken automatically that is greenhouse windows/ doors roll on/off based on the soil moisture levels. Thus, the system will help the farmers to avoid physical visit to the field, and increase the yield with the maintenance of précised parameters such as $CO_2$, soil moisture, temperature, and light in the greenhouse with the help of IoT. The project is carried out with the help of IoT kit and internet connection.

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