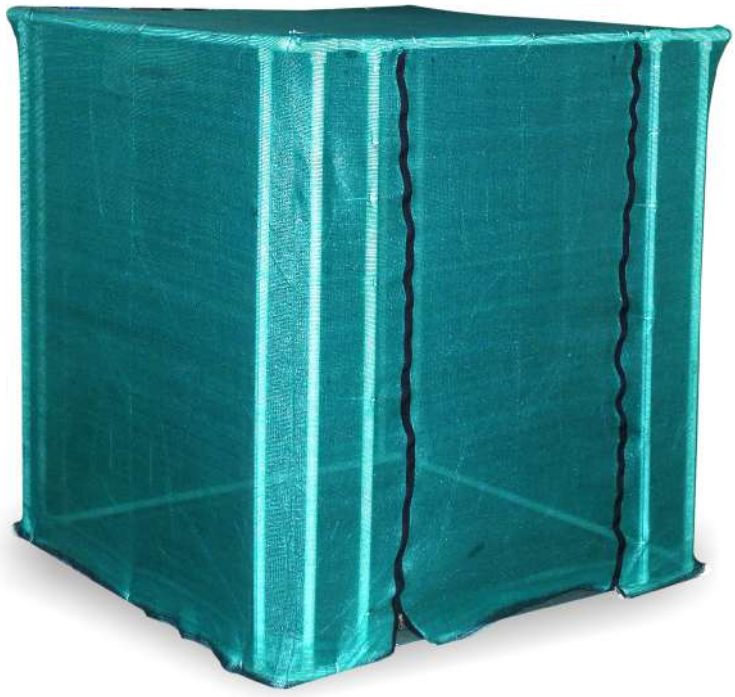
Scientech

IoT enabled system for Greenhouse

Scientech 6205GH



Greenhouse structure

Climatic change is a major challenge for the farmers. More than 95% of farmers follow traditional farming techniques. If a farmer wants to earn more profit from agriculture, then he has to adopt modern farming techniques such as Greenhouse farming (polyhouse farming) or hydroponic farming.

A Greenhouse is a framed structure covered with a transparent or green shaded net material and large enough space inside to grow crops under partial or fully controlled environmental conditions with few sensors to get optimum growth and productivity. Greenhouse farming requires proper environmental conditions for optimal plant growth and health. Most critical to productivity, quality, and energy conservation is the monitoring and control of carbon dioxide (CO2) concentration in combination with temperature, humidity, and many other parameters.

The use of the greenhouse is very fruitful for the production of seasonal and non- seasonal crops, for the production of high-quality flowers, vegetables, and the preparation of nursery.

Scientech 6205GH IoT enabled system for Greenhouse is a comprehensive setup providing the understanding of sensors used in greenhouse farming. Scientech 6205GH consists of carbon dioxide(CO2), oxygen (O2), volatile organic compound (VOC), air temperature & humidity, atmospheric pressure, soil moisture, soil temperature, nitrogen dioxide (NO2), leaf wetness and solar radiation sensors.

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PVC structure

Complete greenhouse

Features

- A friendly platform for experimenters to learn, explore and develop IoT skills in protected cultivation.
- Strong PVC frame and green shaded cover with zip for easy access and ventilation for greenhouse.
- Ideal for pots and seed trays.
- Arduino software compatible hardware.
- IoT based plant monitoring system.
- CO_2 sensor, O_2 sensor, VOC sensor and NO_2 sensor.
- Air temperature & humidity and atmospheric pressure sensor.
- Soil moisture, Soil temperature, Leaf wetness and Solar radiation sensor.
- Battery operated smart sensor gateway for sensor connectivity.
- USB and Zigbee connectivity for personal computer (PC) interface.
- Python, Arduino programming, embedded C and app development.
- Wi-Fi connectivity for cloud interface.
- Sensor gateway with color LCD display.
- Software to view sensor's real time graph analysis on PC and mobile.
- 10 din sockets for sensors and actuators interface.
- On board charging and protection circuit for battery.
- Signal test points and switch faults.
- Inbuilt voltmeter and ammeter.
- User friendly modular setup.

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Scope of Learning

- Understanding of Arduino IDE software.

Interfacing of:

- LED blink program.
- ACD and UART programs.
- Color LCD.
- Wi-Fi and Zigbee module.

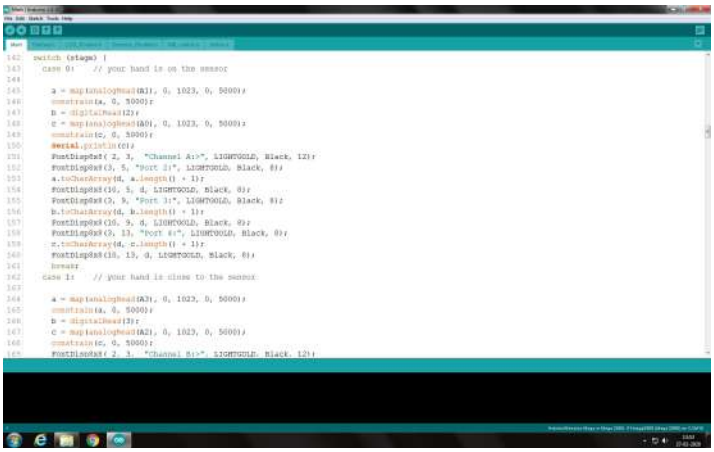
Testing and understanding of:

- CO_2 sensor.
- O_2 sensor.
- VOC sensor.
- Air Temperature & humidity sensor.
- Atmospheric pressure sensor.
- Soil moisture.
- Soil temperature.
- NO_2 sensor.
- Leaf wetness.
- Solar radiation sensor.

Design and develop:

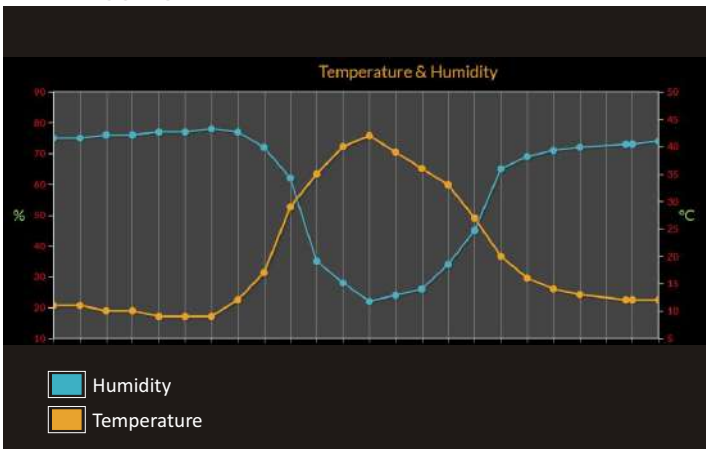
- Smart greenhouse application programs.
- Program to configure events and alarms.
- Interfacing of Wi-Fi and Zigbee modules.
- Transpiration & respiration application.
- Photosynthesis application.
- Implementation of python program to collect data and upload on cloud.

Software window



Sensor interfacing code

Data logging



Temperature & Humidity graph

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Technical Specifications

Microcontroller	: ATMega2560
Sensors and actuator connector	: 10 nos.
Digital input/output pins	: 34 nos.
Analog input pins	: 16 nos.
UART	: 2 nos.
I2C	: 1 no.
Switch faults	: 30 nos.
Test points	: 30 nos.
Power Supplies	: 5V and 3.3V
Variable potentiometer	: 1 no. (10K)
Switches	: 3 nos.
Digital voltmeter and ammeter	: 0 - 25V/10A
Buzzer and LED	: 1 no. each
Color LCD	: 1.77 inch
Battery	: 3.7V/4400mAh
USB	: 2.0
Wi-Fi module	: 1 no. (2.4GHz)
Zigbee transceiver	: 2 nos. (2.4GHz/63mW)
Flash memory	: 256 KB of which 8 KB used by boot loader
SRAM	: 8 KB
EEPROM	: 4 KB
Clock speed	: 16 MHz
Node operating voltage	: 5V DC
Temperature sensor	: 0-100^{0}C
Humidity sensor	: 0-100 %RH
O_2 sensor	: 0-25%
CO_2 sensor	: 0-2000ppm
VOC sensor	: 1-50ppm
NO2 sensor	: 0-20ppm
Leaf wetness	: Analog Voltage
Atmospheric pressure sensor	: 15- 115kPa
Solar radiation sensor	: 0 to 2000W/m2
Soil moisture	: Analog voltage
Soil temperature	: 0 to 100^{0}C
Power Supply	: 5V DC adaptor
Weight	: 3.5Kg (approximately)
Operating conditions	: 0-40^{0}C, 85% RH
Green house (LxWxH)	: 5 x 5 x 5 (in feet)

Package contains — Quantity (nos.)

- Green house structure assembly — 1
- Scientech 6205SSN — 1
- SS165 CO_2 sensor — 1
- SS166 O_2 sensor — 1
- SS170 VOC sensor — 1
- SS150 Air temperature and humidity sensor — 1
- SS175 Atmospheric pressure sensor — 1
- SS157 Soil moisture sensor — 1
- SS162 Soil temperature — 1
- SS167 NO_2 sensor — 1
- SS156 Leaf wetness sensor — 1
- SS180 Solar radiation sensor — 1
- A to B USB cable — 1
- DC adapter 5V/3A — 1
- Patch cord — 5
- Antenna 2.4 GHz — 1
- USB Zigbee receiver — 1

Subject to change Version 1.0

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