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).

A Greenhouse is a framed structure covered with a transparent or green shaded material and large enough space inside to grow crops under partial or fully controlled environmental conditions with some sensors to get optimum growth and productivity. Greenhouse farming requires proper environmental conditions for optimal plant growth and health.

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(CO_2), oxygen (O_2), volatile organic compound (VOC), air temperature & humidity, soil moisture, soil temperature, nitrogen dioxide (NO_2), leaf wetness and solar radiation sensors.

Included Sensors

- **Soil Moisture Sensor:** This sensor helps in maintaining optimal soil moisture levels for plant growth while preventing over or under-watering.

- **Soil Temperature Sensor:** This data helps in regulating the temperature for optimal plant growth and in understanding soil health and microbial activity.

- **Nitrogen Dioxide (NO2) Sensor:** Elevated NO2 can harm plant health, so detecting and managing these levels is crucial for maintaining a healthy growing environment.

- **Solar Radiation Sensor:** It helps in optimizing the placement of plants for adequate sunlight exposure and assists in adjusting shading systems or lighting within the greenhouse.

- **Temperature and Humidity Sensors:** These sensors help in maintaining optimal growing conditions and preventing issues related to temperature fluctuations and excessive humidity.

- **Volatile Organic Compound (VOC) Sensor:** Detects airborne VOCs emitted by plants, pests, or other sources.

  Oxygen and Carbon Dioxide Sensors: Maintaining proper gas levels is crucial for photosynthesis and overall plant health.

- **LED Grow Lights:** LED lights provide specific light spectrums that can be adjusted based on plant needs, enhancing photosynthesis and growth during periods of insufficient sunlight.

- **Leaf Wetness Sensor:** It helps in disease prevention by alerting growers when conditions are favorable for certain fungal infections.

Features

- A friendly platform for experimenters to learn, explore and develop IoT skills in protected cultivation.
- Strong metallic frame and transparent polycarbonate structure for greenhouse.
- Ideal for pots and seed trays.
- Microcontroller software compatible hardware.
- IoT based plant monitoring system.
- Battery operated smart sensor gateway for sensor connectivity.
- USB and Zigbee connectivity for personal computer (PC) interface.
- Wi-Fi connectivity for cloud interface.
- Sensor gateway with color LCD display.
- Android application to view sensor's real time values for analysis on 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.
- UV protected polycarbonate structure.
- User friendly modular setup.

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.
- 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.

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	:	$0\text{-}100^0C$
Humidity sensor	:	0-100 %RH
O2 sensor	:	0-25%

CO_2 sensor	:	0-2000ppm
VOC sensor	:	1-50ppm
NO2 sensor	:	0-20ppm
Leaf wetness	:	Analog Voltage
Solar radiation sensor	:	0 to $2000W/m^2$
Soil moisture	:	Analog voltage
Soil temperature	:	$0\text{ to }100^0C$
Power Supply	:	5V DC adaptor
Operating conditions	:	$0\text{-}40^0C$, 85% RH
Green house dimensions	:	H80 x W60 x L50 (in cm)
Polycarbonate thickness	:	6mm

Package contains — Quantity (nos.)

Package contains	Quantity (nos.)
• Green house structure assembly	1
• Scientech 6205SSN	1
• SS165 CO2 sensor	1
• SS166 O2 sensor	1
• SS170 VOC sensor	1
• SS150 Air temperature and humidity sensor	1
• SS157 Soil moisture sensor	1
• SS162 Soil temperature	1
• SS167 NO2 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