

# City Greens

## Farm Zig *by CityGreens*

Automation and Farm Management Solutions

Awarded by



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Ministry of Agriculture  
& Farmers Welfare  
Government of India



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NATIONAL  
STARTUP  
AWARDS 2022  
By #startupindia



# Automation for



**Naturally  
Ventilated Farm**



**Climate  
Controlled Farm**



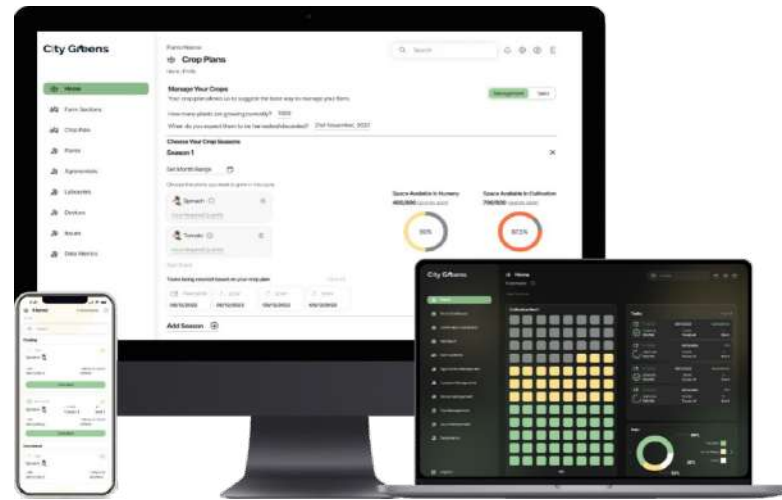
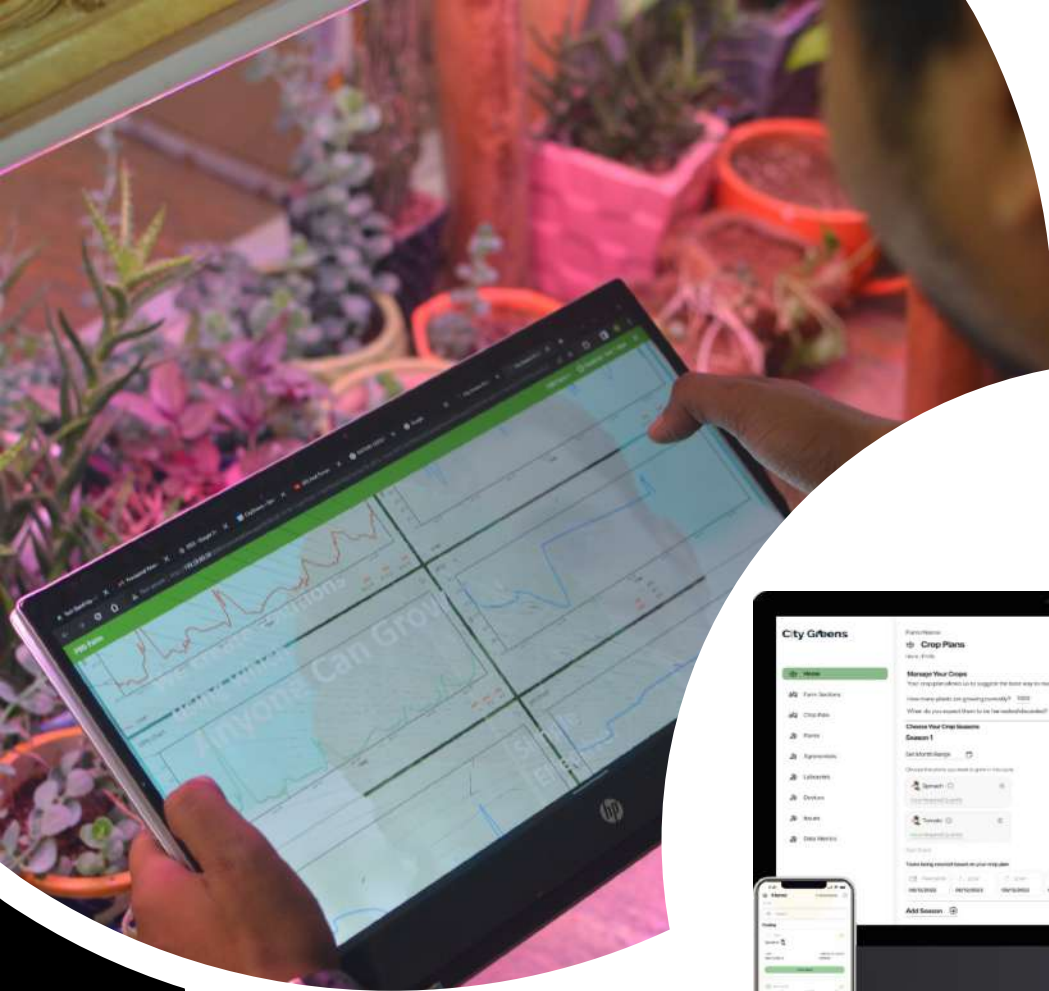
**Indoor  
Vertical Farm**

# Modules

## Farm Management System (FMS)

Software solution.

Automates crop cycle planning and routine farm tasks.



## Farm Automation System (FAS)

Hardware solution.

Automates critical tasks and eliminates human errors.



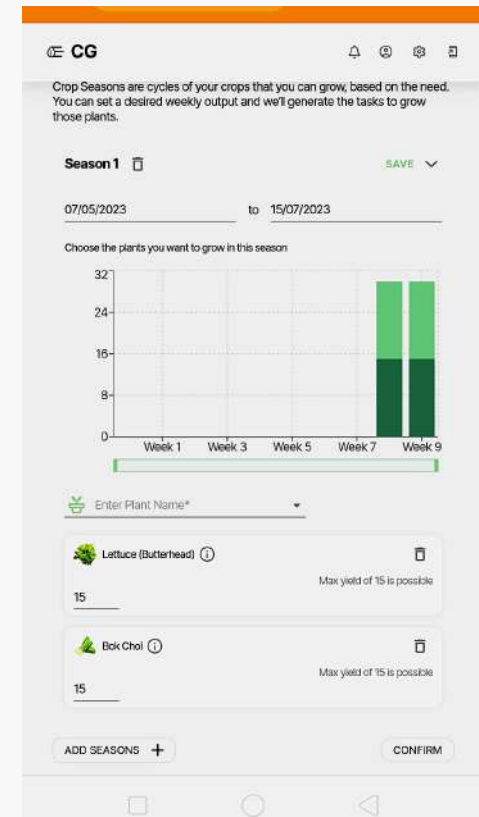
## FAS – Features

- Climate control.
- Nutrient management.
- Irrigation control.
- Power management.



## FMS – Features

- Crop cycle management.
- Agronomy management.
- Resource management.
- Remote monitoring.



# Features Overview

## Farm Automation System (FAS)

### Climate Control

Intelligent rule engine that can handle complex combinations of both sensor based & time-based logic.

### Nutrient Management

Automated nutrient dosing & balancing. Ensures the plants get adequate & timely nutrient dosage every single time.

### Irrigation Control

Controls the timing and quantity of nutrient delivery. Times the cycle to when the propensity of uptake is maximum.

### Power Management

Centralised power distribution to provide an additional protective layer while also saving substantial energy costs.

## Farm Management System (FMS)

### Crop Cycle Management

AI-based software to grow multiple crops of different time-frames and harvest cycles in one farm.

### Agronomy Management

Online reporting of agronomy issues from field. Remote resolution through centralised agronomy.

### Resource Management

GPS based check-in & check-out features for labour and resource management.

### Automation Integration

Integration with automation hardware (FAS) to give a unified view of the farm to the grower.

# Results Achieved

## Operational Efficiencies

39% reduction in electricity bill<sup>1</sup>.

36% improvement in water usage efficiency<sup>2</sup>.

17 crops managed together in one crop cycle<sup>3</sup>.

## Improved Rol

13% improvement in yields.

40% improvement in profitability.

1. <https://www.farmzig.com/cs1>

2. [https://www.researchgate.net/publication/314295384\\_Vapour\\_pressure\\_deficit\\_control\\_in\\_relation\\_to\\_water\\_transport\\_and\\_water\\_productivity\\_in\\_greenhouse\\_tomato\\_production\\_during\\_summer](https://www.researchgate.net/publication/314295384_Vapour_pressure_deficit_control_in_relation_to_water_transport_and_water_productivity_in_greenhouse_tomato_production_during_summer)

3. <https://www.farmzig.com/cs2>



# Our Technology – Their Words

CityGreens 3.25-acre farm runs entirely on renewable energy using geothermal cooling and solar instead of drawing power from grid.

*Forbes India, August 2023*

CityGreens technology suite is comparable to those offered by advanced Israeli companies but comes at only one-tenth of the cost.

*Krishi Jagran, April 2023*

CityGreens has setup the first fully automated farm for growing medical cannabis using aeroponics technology in India.

*The Better India, September 2022*

CityGreens, the brainchild of an IIM Kolkata alumnus, has earned the sobriquet of India's most awarded hydroponics startup.

*Financial Express, August 2022*

CityGreens is a startup working in the shadows, developing technologies that can bring ground-level changes in the agricultural ecosystem.

*Agriculture Today, February 2022*

INDIA  
**Forbes**

**KJ** KRISHI  
JAGRAN

the  
better  
india



**THE  
FINANCIAL  
EXPRESS**

**AGRICULTURE**  
The National Agriculture Magazine  
**TODAY**



**Farm Zig**

*by*

**City Greens**

## Case Studies

Following examples show the kind of automation solutions that can be implemented in different kind of farms growing different kind of crops using different technologies.

Please note that the list is not exhaustive.

We continue to innovate and create newer and better solutions.

Do reach out to us for a customized solution that solves your specific problem.



# Naturally Ventilated Farm

## Solution

### Sensors

Temperature, humidity, VPD, lux, rain, pH, EC, water temp, float sensors, solenoid valves.

### Automation

1. ACF and VF are operated based on temperature data with a failsafe protection of cool down period to prevent the equipment.
2. Fogging system is operated based on temp and humidity data. The run time is configured with an upper bound for crop protection.
3. Roll down curtains are operated based on temperature & humidity difference inside and outside the greenhouse, light intensity, and whether it's raining or not. The preference is determined by a sophisticated rule engine.
4. Nutrient is balanced before each irrigation cycle using pH and EC sensors coupled with an automatic dosing system.
5. Chilling unit is turned on if temperature of nutrient rises to unsafe levels.
6. Crops are irrigated when the transpiration rate favours nutrient uptake. There is a time bound override as a failsafe.
7. The farm is divided into smaller segments. Each segment is irrigated one after the other ensuring near consistent nutrient delivery to all plants.
8. Water level is monitored and maintained in all tanks, viz nutrient, RO, primary storage automatically to save pumps and eliminate human dependency.

**Crop:** Tomatoes

**Greenhouse:** Naturally Ventilated Polyhouse

**Size:** 1 Acre

**Growing System:** Cocopeat grow slabs

**Equipment:** Air Circulation Fans (ACF),  
Ventilation Fans (ridge), Fogging system, Roll  
down curtains, Pumps

## Devices



IoT Hub



Sensors

Automation Controller

Auto Nute

Nutrient  
Management



Electro Box

Power Management



# Climate Controlled Farm

## Solution

### Sensors

Temperature, humidity, VPD, lux, rain, pH, EC, water temp, float sensors, solenoid valves, Dissolved Oxygen, ORP.

### Automation

1. In addition to automations covered in previous example.
2. The operations of farm is divided into two time zones, viz Day and Night.
3. Exhaust Fan (EF) and Cooling Pad (CP) system is operated only during the day-time based on temperature and humidity levels inside the polyhouse.
4. Timings of EF and CP are synced to ensure that fans never run on dry pads, dry zones are minimised, salts deposits are reduced, and life of pads is increased.
5. Ventilation Fans are used for temperature control during the day-time and for humidity control during the night-time.
6. Oxygen levels are monitored and maintained in the DWC system.
7. Algae level and microbiota population is controlled in both DWC and NFT systems by maintaining ORP levels in the healthy zone.
8. All the equipment and systems are powered through a unified power management system that provides failsafe protection against voltage fluctuations, missing phase, power surges and other electrical faults. (this feature is also available in the case of Naturally Ventilated Farm)

**Crop:** Leafy Greens (Lettuces & Spinach)  
**Greenhouse:** Climate Controlled Polyhouse  
**Size:** 1 Acre  
**Growing System:** NFT tables, DWC Channels  
**Equipment:** Exhaust Fans (EF), Cooling Pad (CP), Air Circulation Fans (ACF), Ventilation Fans (arches), Fogging system, Roll down curtains, Pumps

## Devices



IoT Hub



Sensors

Automation Controller

Auto Nute

Nutrient Management



Electro Box

Power Management



# Indoor Vertical Farm

## Solution

### Sensors

Temperature, humidity, VPD, PAR, CO2, pH, EC, water temp, float sensors, solenoid valves, Dissolved Oxygen, ORP, IR Sensor.

### Automation

1. In addition to automations covered in previous example, excluding EF and CP.
2. The operations of Air Conditioning system and Dehumidifier is controlled to maintain ambient temperature and humidity for optimal plant growth.
3. The operation of Ventilation Fans and CO2 generator are controlled to maintain the right quality of air.
4. Inbuilt failsafe to monitor quality of air and deactivate CO2 generators when humans are inside the farm.
5. The duration of switching on grow-lights is determined automatically based on specific needs of plants.
6. The crop planning schedule for 20 crops is prepared automatically through the Software module.
7. The day-to-day tasks, for each set of 20 crops, for the agronomists are assigned automatically by the software module through Artificial Intelligence (AI).

**Crop: Leafy Greens (20 Varieties)**  
**Grow Environment: Indoor Vertical Farm**  
**Size: 1,000 Sq Ft, 12 Feet ceiling clearance**  
**Growing System: NFT racks**  
**Equipment: Air Conditioner (AC), Dehumidifier, Air Circulation Fans (ACF), Ventilation Fans, CO2 generator, Plant Grow Lights, Pumps**

## Devices



IoT Hub



Sensors

Automation Controller

Auto Nute  
Nutrient  
Management



Electro Box

Power Management





**Got queries?**

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**City Greens**

Hope this was useful. To know more about CityGreens, ask for our profile.