# Automated Microgreens Growing Machine

**Project Sponsor:** John Berger

## Problem Statement:

Our team was tasked with creating a prototype automated microgreens growing machine that produces 2 cups of greens per day with minimal user input.
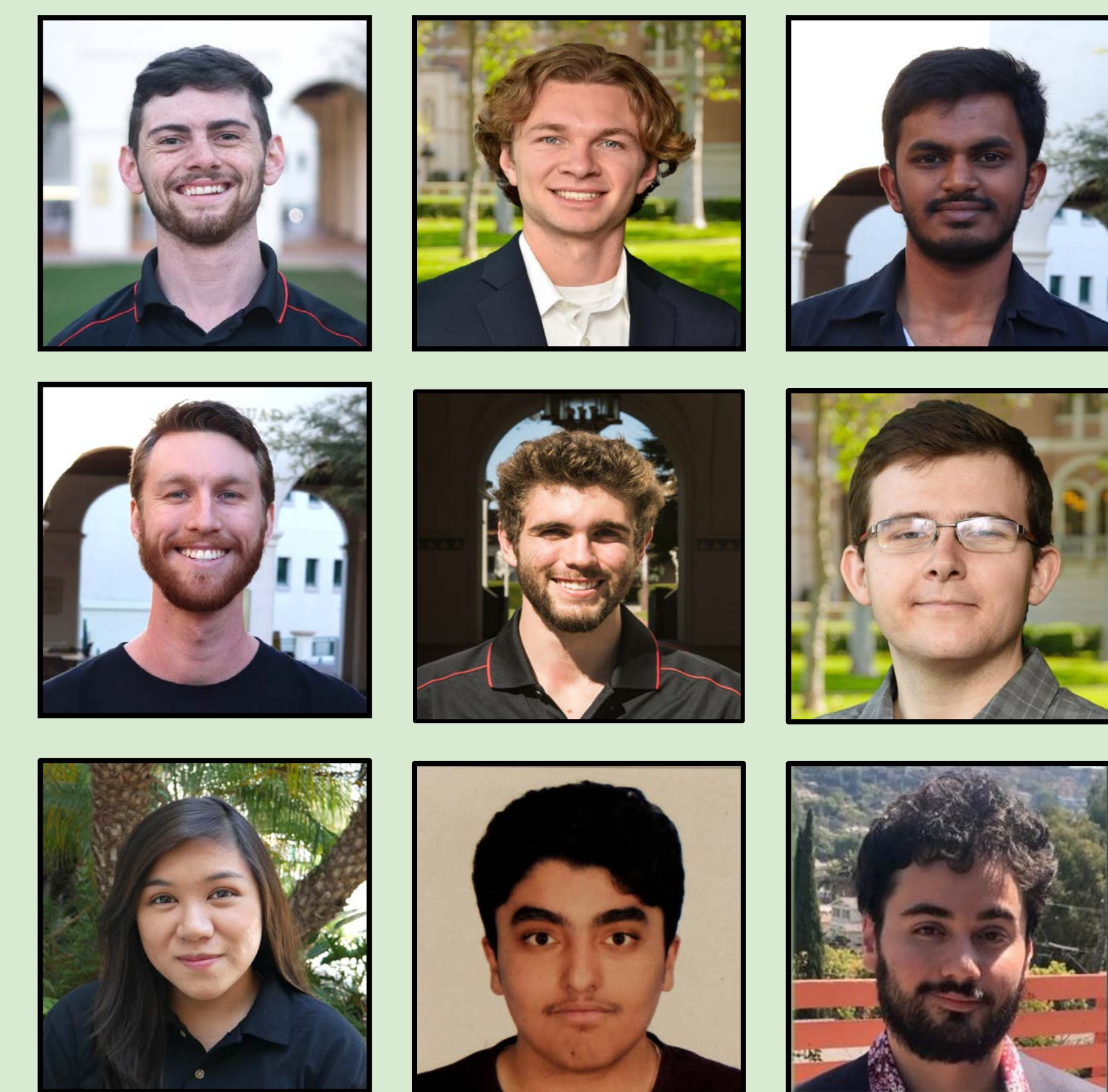
## Key Requirements:

- Autonomous climate control, watering, lighting, nutrient dispensing.
- Produce Two cups of microgreens per day
- Support a 90kg load on its roof.
- Users shall be notified via app that greens are ready to harvest.
- Aggregate growth data available online
- Grow multiple varieties of microgreens

### HOW IT WORKS

Place Pre Seeded Mat

1

2

3 Harvest!

## Team Members
**Mechanical Team:**
John Berger, Conor Vasiliadis, Thuya Sathiamurthi, Max Merritt
**Electrical/ Computer Team:**
Eli Wooten, Daniel Kenner, Abigail Dabu, Ali Alqaoud, Jose Baez

**Professors:** Dr. Shaffar & Prof. Dorr
**Advisors:** Mr. Lester & Prof. Arnold

## Systems:

### Watering System

- 18 gallon ABS water tank supplies grow trays and climate control system with water.
- Five 12V solenoids allow water into each growing area on 15 minute intervals.
- Ebb and flow hydroponics allows for minimal power draw and high solenoid off time.
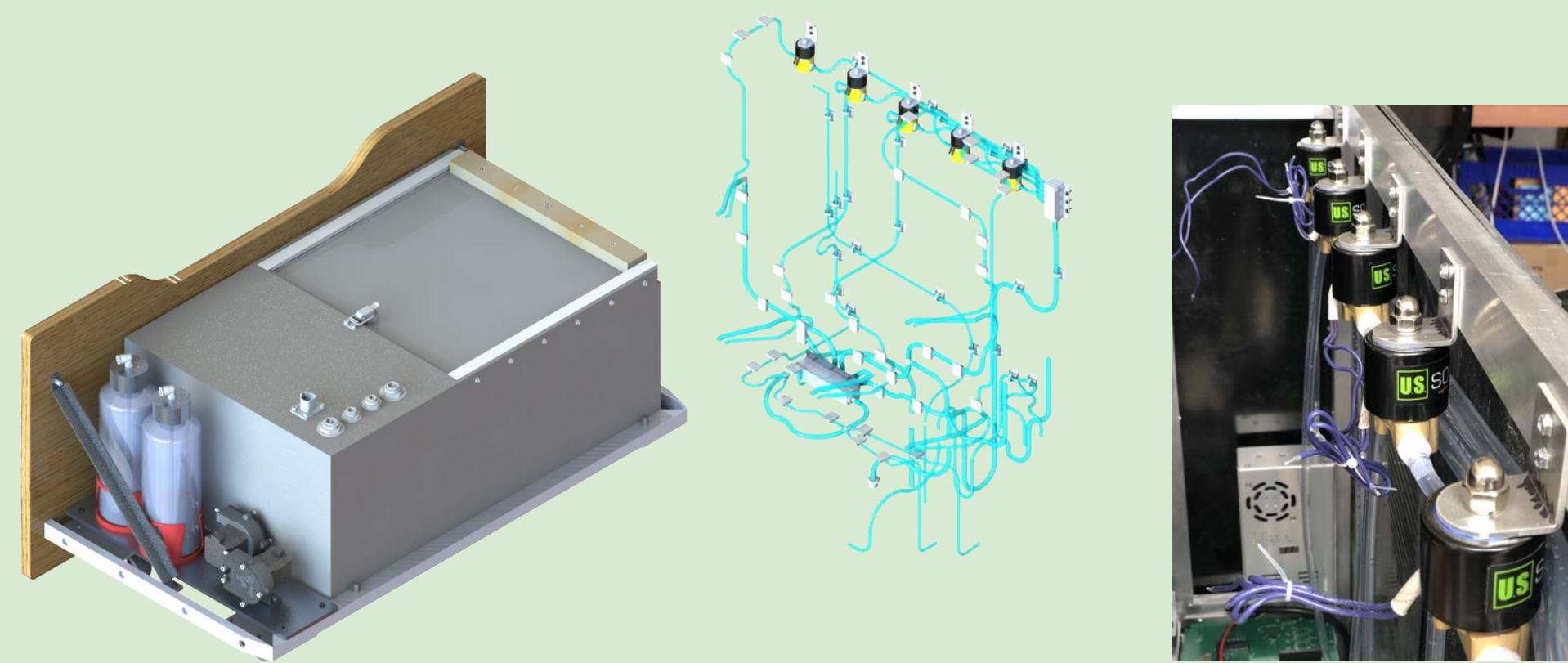
### Climate Control

- Galvanized steel ducting.
- 120 CFM fan provides greens with fresh air.
- Using an evaporative cooler, the climate control can cool a hot dry environment.
- Thermo-electric cooler treats the water to increase cooling power.
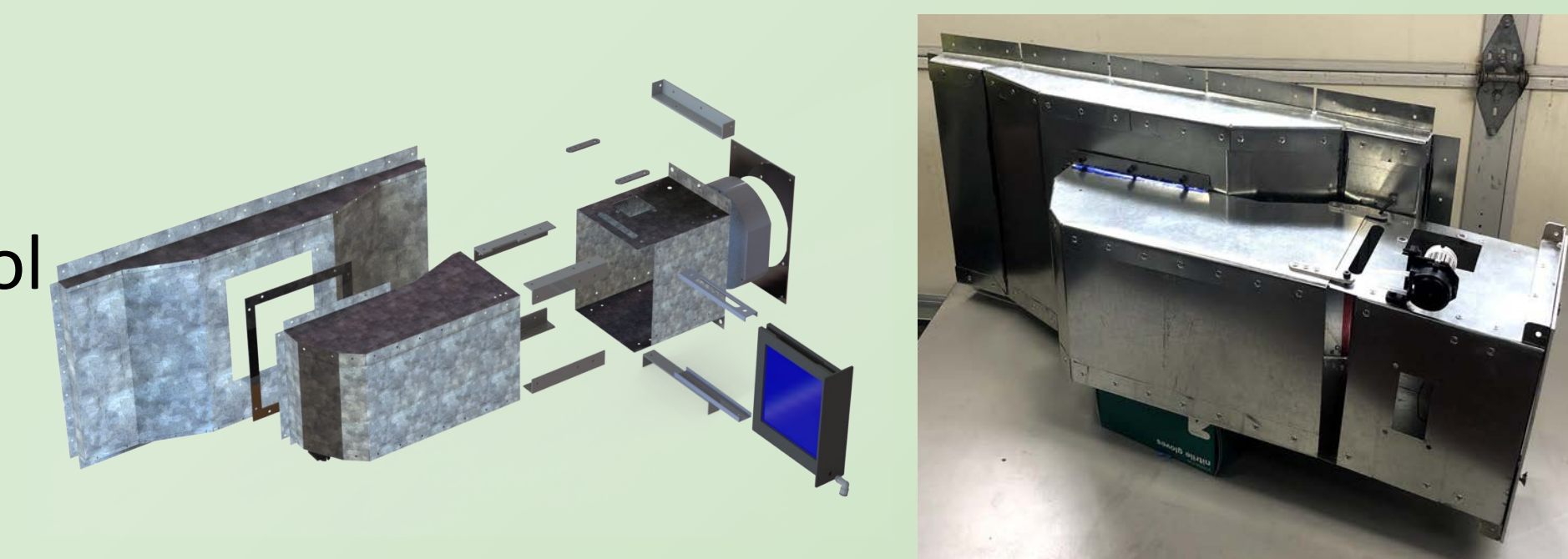
### pH and Nutrient Control

- Water temperature, electric conductivity, and pH level are monitored in the 3-D printed sensor tank when the pump runs.
- 3-D printed peristaltic pumps driven by stepper motors dispense a metered amount of pH or nutrient solution.
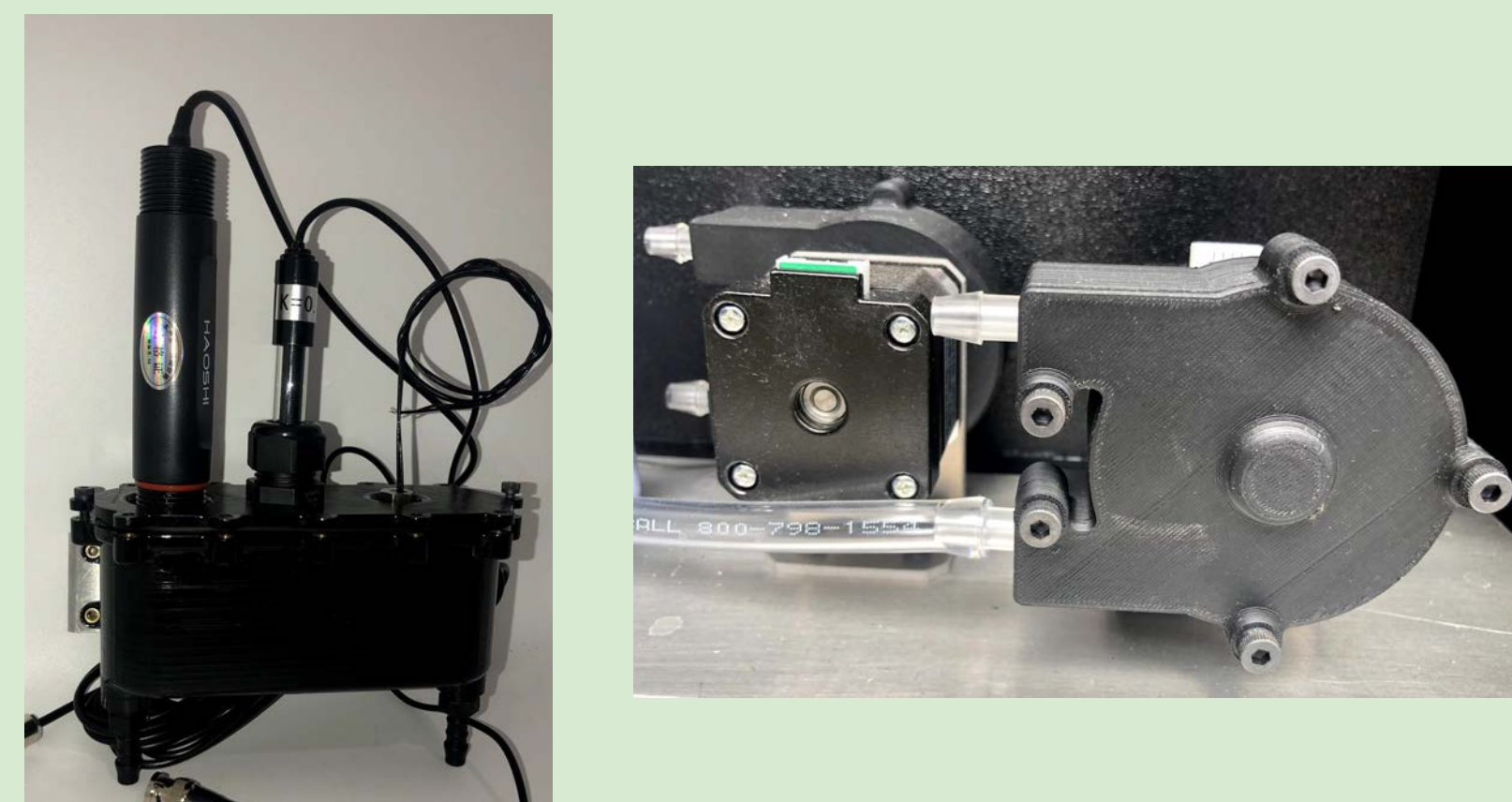
### Lighting System

- Five 10" x 10" LED PCBs provide light to the greens.
- Lighting quality maintains the following ratios: R87:B10:FR2.5 with 15% adjustability on each wavelength.
- Lighting system shall provide >15 Daily Light Integral.
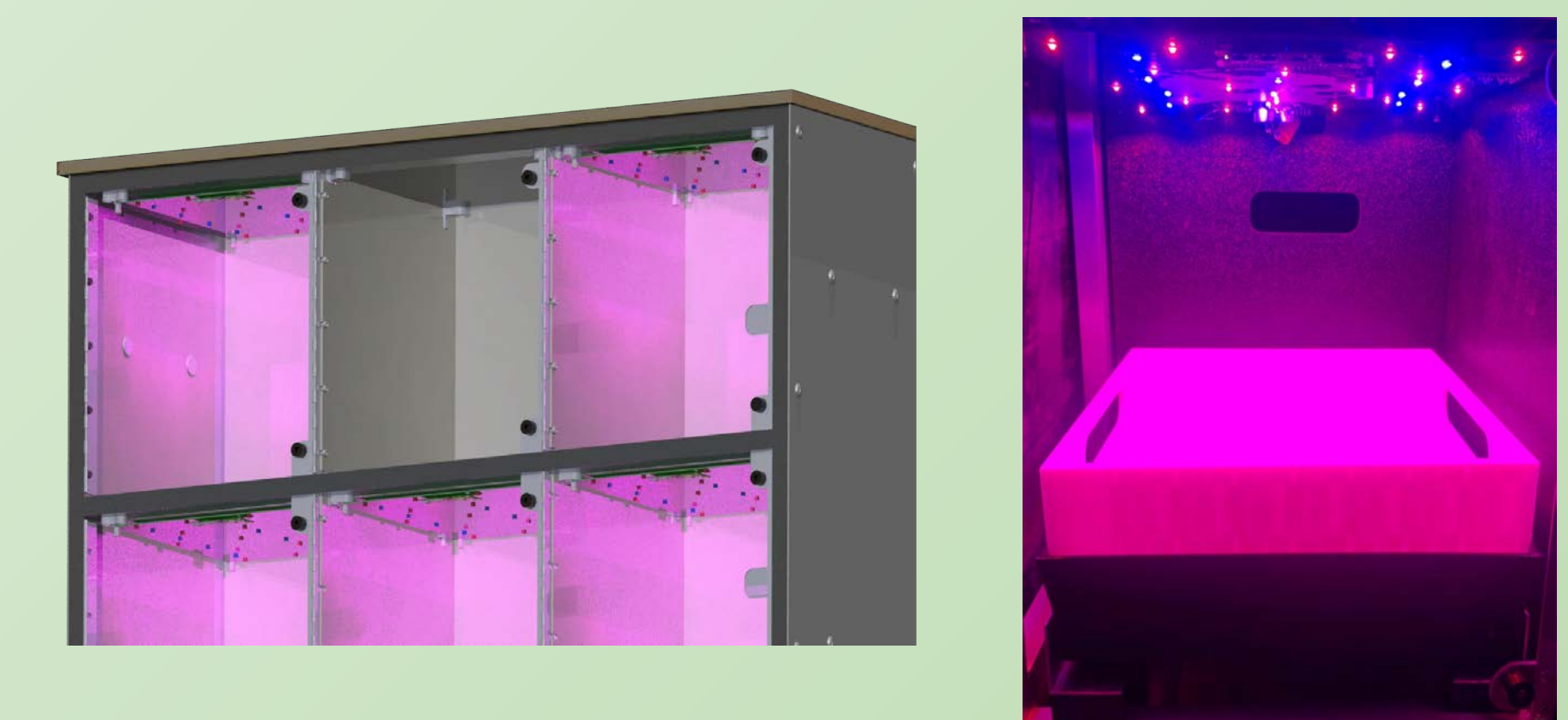
### Structure and Growing Area

- Welded aluminum tube structure.
- ABS panelling and easy latching doors.
- Removable 3-D printed grow trays allow user to harvest with ease.
- Weight sensors allow tracking of growth for each tray.
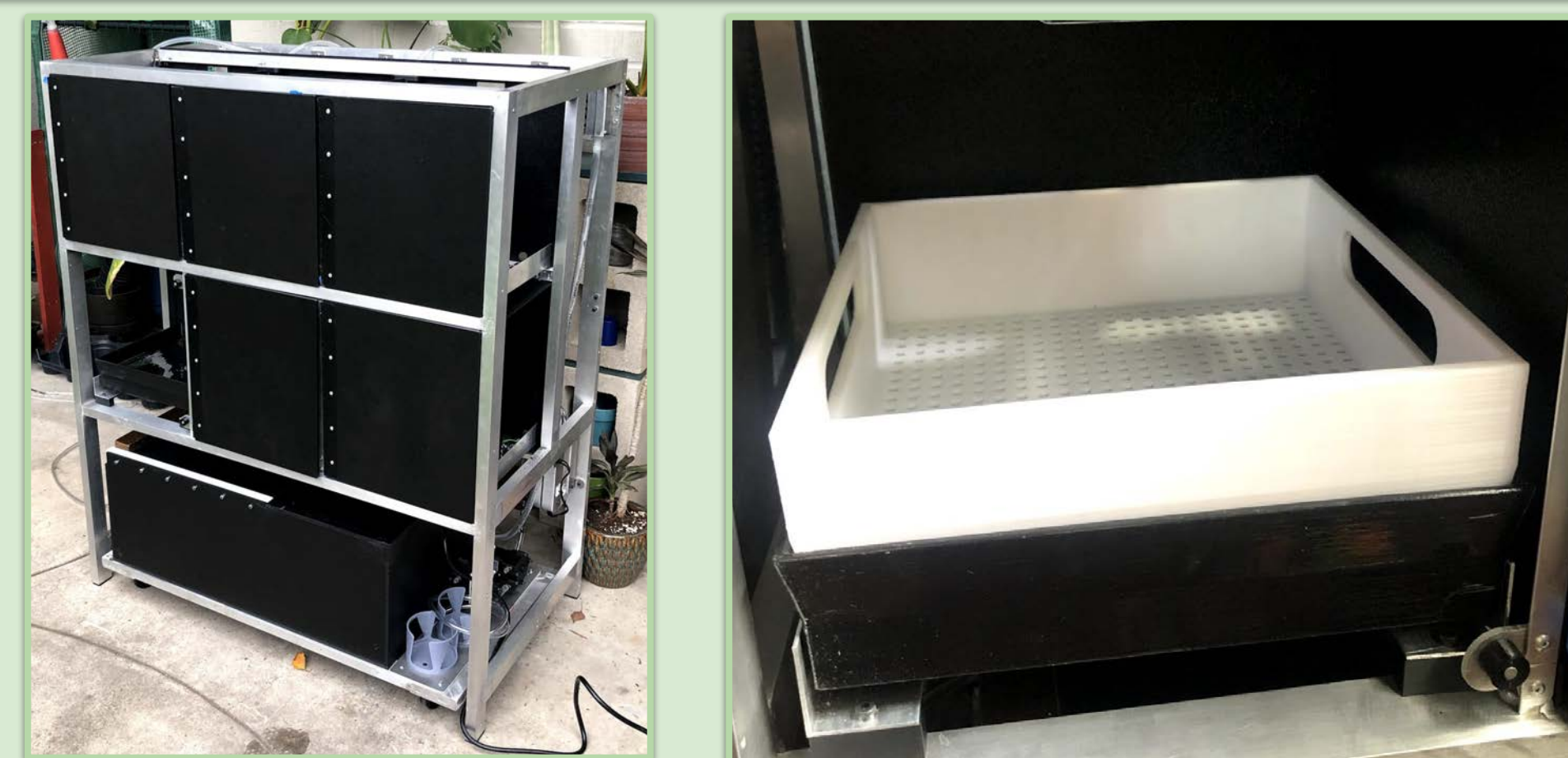
### User Interface

- Cycle initiation, harvest notifications, and aggregate growth data is available through the ATOMGREENS website.

Dashboard

| Tray 1 | Tray 2 | Tray 3 | Tray 4 | Tray 5 |
|--------|--------|--------|--------|--------|
| 100% | 50% | 75% | 100% | 25% |
| More info | More info | More info | More info | More info |

Notifications

Current Weight: 37.0 gram

Current Stats

| | Current PH | PH Tank Level (%) | External Temperature (°F) | External Humidity (%) |
|---|---|---|---|---|
| | 7.0 | 80 | 70 | 30 |
| | Current EC | Nutrient Tank Level (%) | Current Temperature (°F) | Internal Humidity (%) |
| | 6.0 | 80 | 36.0 | 8.0 |

Senske Mode