GOhydro

A smart-sensing AI-driven platform for scalable, low-cost hydroponic units

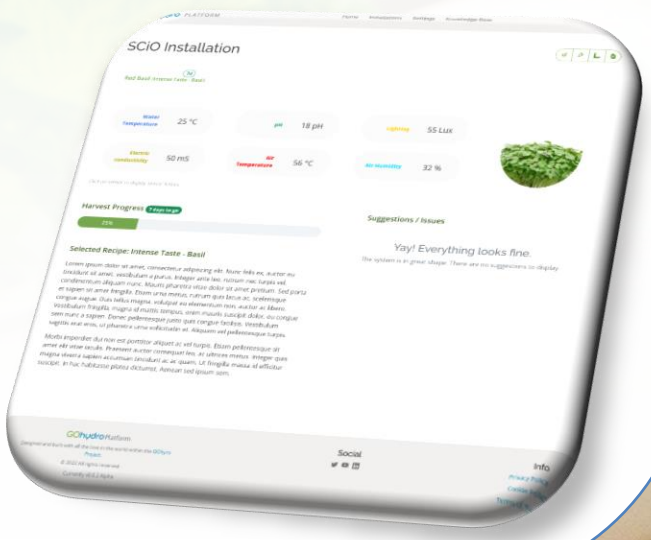
Summary

Hydroponics have emerged as a viable solution to one of the biggest challenges of humanity in the 21st century: to devise sustainable food production paradigms with minimized environmental impact

For the evolution and democratization of hydroponic cultivation, **GOhydro proposes a low-cost, DIY hydroponic unit, equipped with different sensors for monitoring the cultivation and empowered by tailored AI technologies for optimising plant growth**

GOhydro builds on thoroughly researched and rigorously tested "climate recipes" to identify the ideal conditions for growing and exploits sensing and analytics technologies to continuously control the state of the plants in the hydroponic unit and propose mitigative actions.

The real value comes from the informed analysis of the collected data and the provision of clear guidelines for the growers to treat their cultivation via the GOhydro mobile app



Main Objective / Research Question

"How to optimize microgreens growth and cultivation even in low-cost, low-maintenance, ubiquitous hydroponic installations"

Objectives:

- Obj 1: Concretize best practices for microgreens growth (e.g., basil, parsley, coriander) in urban settings by everyday people
- Obj 2: Model and correlate best practices with readings from easily attainable and installable sensing equipment
- Obj 3: Automate microgreens monitoring and streamline decision support for growers

Preliminary Results

- Formulation of climate recipes, i.e., instructions for optimising cultivation and coming up with sufficient and nutritional yield
- Design of the GOhydro Sensor Kit that incorporates sensors for air/water temperature, humidity, and light conditions, into a single custom-designed enclosure kit compatible with **common 3D printing technology** and freely available as open hardware
- Recipes put to the test in growth chambers. Ongoing recipe testing in controlled living spaces

Preliminary Conclusions / Potential Impact

- ✓ **Economic benefits:** increased productivity per unit area, reduced transportation cost and carbon footprints, year-round production and energy efficiency.
- ✓ **Environmental benefits:** reduction of soil erosion and land degradation, freeing up land for vegetation regrowth and reforestation to reverse climate change, reduction of water usage, and zero release of fertilizers and pesticides
- ✓ **Societal benefits:** adding value to living spaces, promoting healthy eating, and utilisation of underused spaces.

Future Research Activities

- ❑ Complete second cycle of climate recipe testing in living spaces with controlled conditions
- ❑ Use the collected data for training Artificial Intelligence models associating sensing measurements with yield and quality, over data acquired via the pilots and augmented with laboratory measurements of their nutritional quality based on novel photonic sensing technologies
- ❑ The most successful recipes as determined by the two cycles will be tested in the final trials, organised in fully uncontrolled living spaces
- ❑ Incorporation of the trained models in the GOhydro data platform and connection with the GOhydro mobile e-agronomist app to provide guidelines for tending the plants and calibrating the unit

Topic 1: Data-driven ICT platforms and solutions to improve the sustainability of agri-food Systems