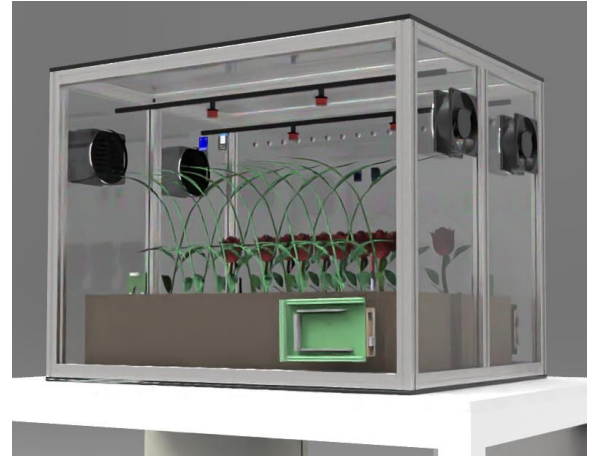# SMART GREENHOUSE
DL GREEN-STEM

Greenhouse-grown products have become indispensable to our daily life, from food production to flower nursery activities. However, even if productivity in greenhouses is generally higher than in open field crops, it becomes necessary to improve its efficiency and sustainability.

For a better future it is important to transmit the values of sustainability and respect for the environment to the youngest. De Lorenzo has developed a small two-zone greenhouse for this very purpose, perfect for a first approach to botany, where young children can create their own cultivation in an environment with a rich educational content.

The system consists of 2 zones, where for each of them it is possible to monitor humidity, temperature and lighting. The sensors in the greenhouse are connected to a dedicated Arduino board that takes care of data acquisition and communication. Through a dedicated software it is possible to communicate with the Arduino board to acquire and analyse data directly from the PC. Communication with the system can also be done remotely through a WIFI connection.

DIDACTIC EXPERIENCE

In addition to the activities related to cultivation, the student who uses the De Lorenzo's intelligent greenhouse will have the opportunity to carry out the following didactic experiences:

- Verification of optimal environmental humidity values according to the type of crop.
- Verification of optimal temperature values according to the type of crop.
- Verification of optimal pH values in soil.
- Statistical analysis of values stored in the database
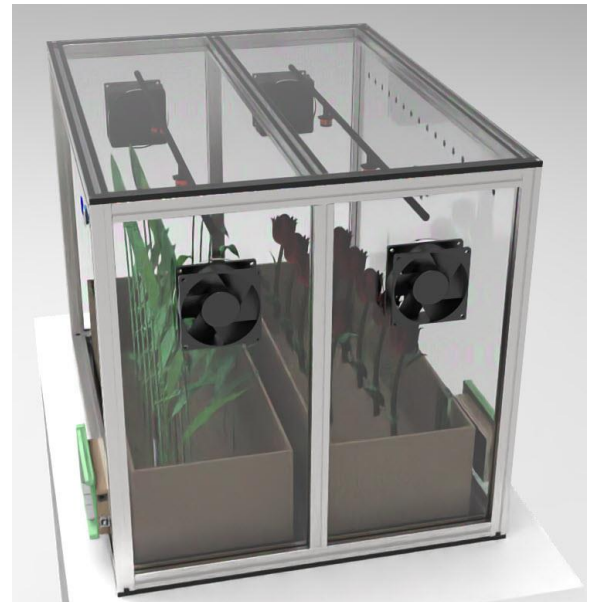
It requires:
- Internet connection
- Water (also from tank) and electrical supply
- A sufficiently illuminated environment
- PC for data processing

TECHNICAL SPECIFICATIONS

Frame:
- Dimensions:
  - Length: 60 cm.
  - Width: 45 cm.
  - Height: 45 cm.

- Removable metal structure:
  - High resistance to corrosion.
  - Natural anodized finish.
  - High mechanical resistance.

- High strength plastic covers.

Greenhouse:
- Side ventilation - adjusts humidity and temperature according to environmental conditions.
- Heater for temperature variation.
- Drip and rain irrigation system (direct connection to the power key). The selection is done manually.
- Containers for substrate or soil. Each container forms a zone.
  - 2 containers:
    - Length: 43 cm.
    - Width: 20 cm.
    - Height: 15 cm.
- Zoned irrigation control divided into 2 areas.

Sensors:
- Ambient humidity and temperature (Qty 2)
- Humidity in the soil. (Qty 2)
- Flow sensors (Qty 1)
- Illumination sensor (Qty 1)
- Ph sensor (Qty 2)

Actuators:
- Automatic liquid control valve (Qty 2)
- Fan (Qty 2)
- Heater (Qty 2)
- Water pump (Qty 1)

Data acquisition and management software

Control unit based on Arduino board