

Hydrophonic IoT Kit for STEM Education

- Enhancing Sustainability and Technological Learning
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Introduction

- Need for sustainable agriculture
- Hydroponics: A soilless farming technique
- IoT integration for real-time monitoring



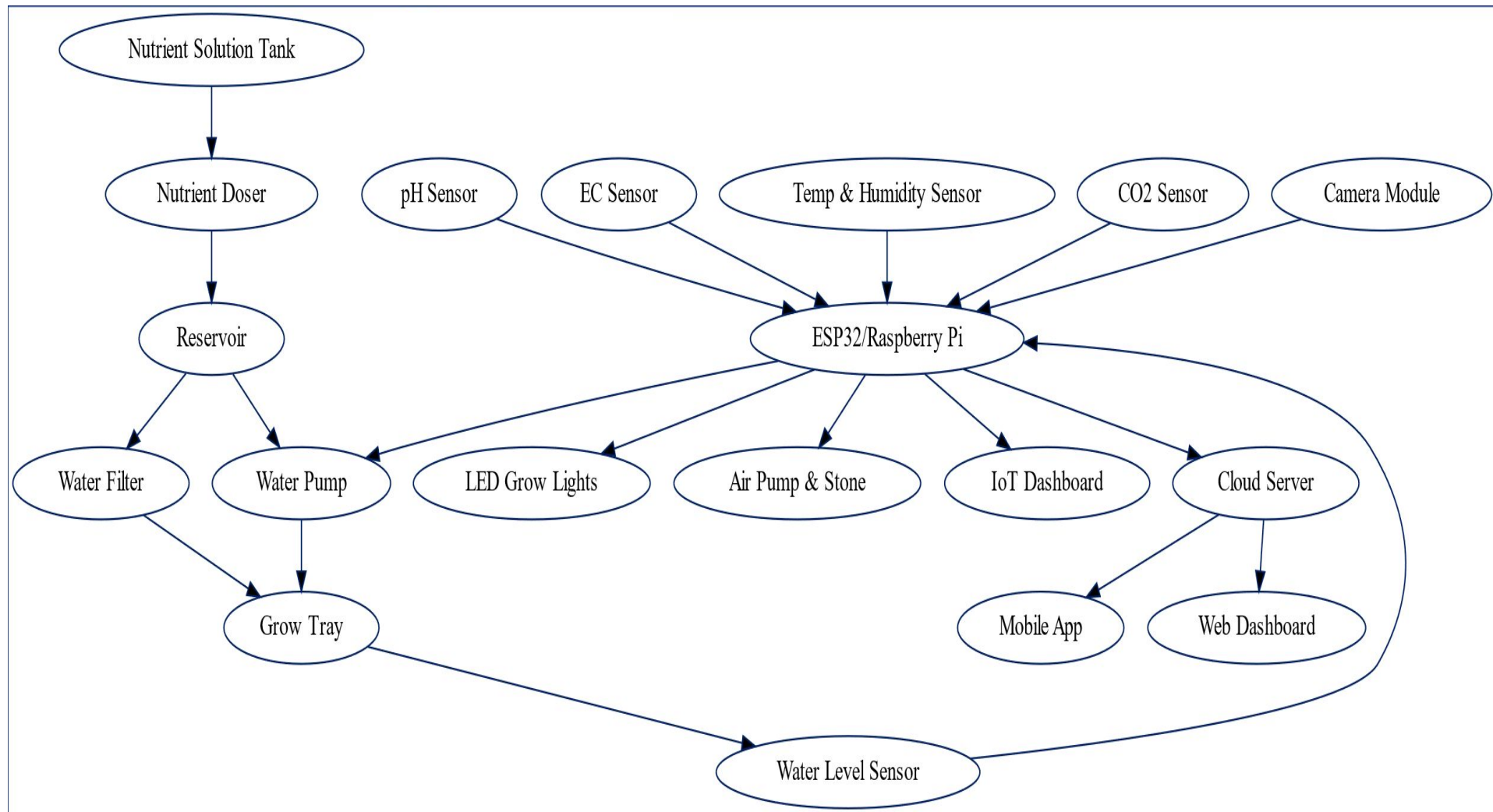
System Overview

Interactive learning
platform

Supports STEM
education

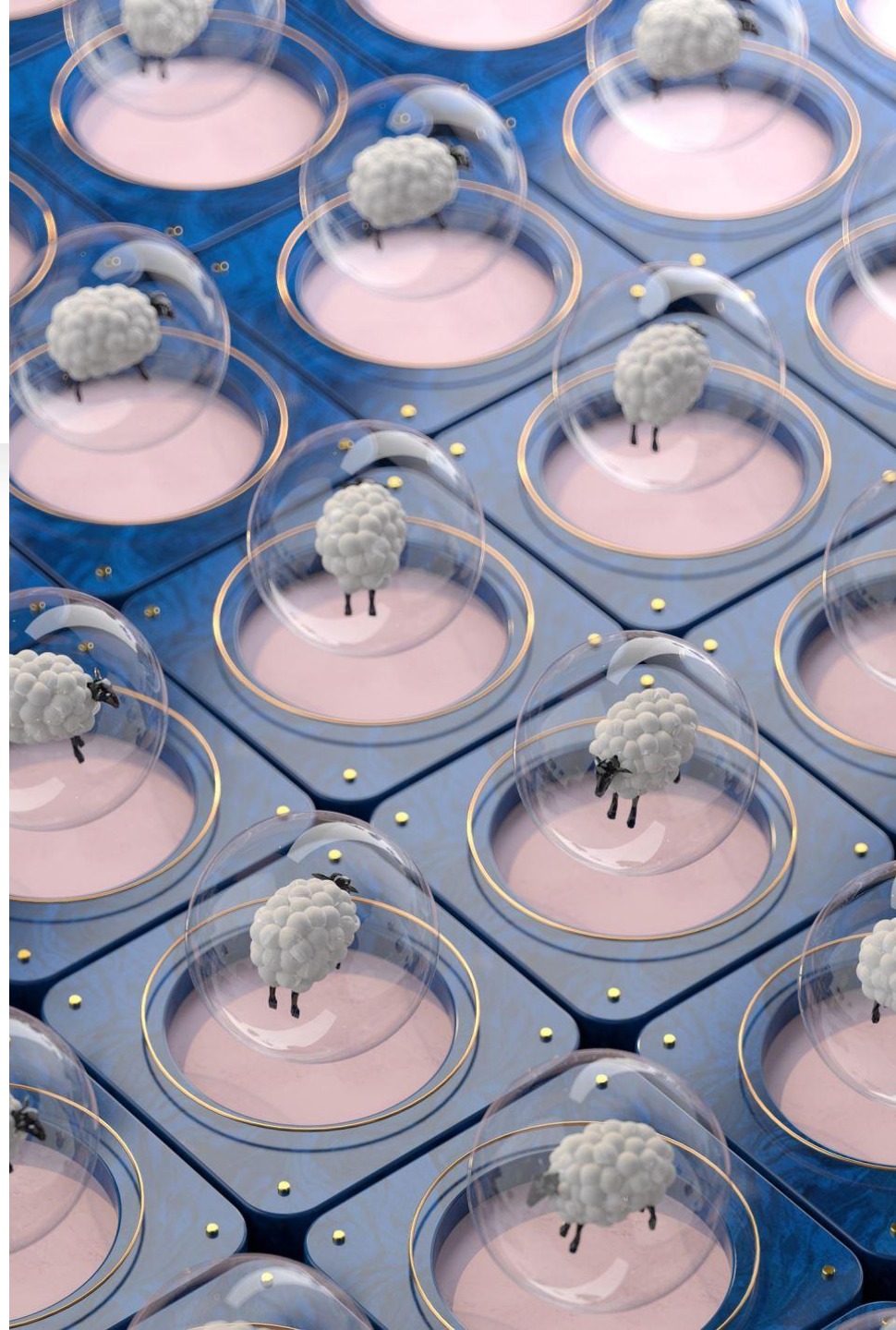
Hands-on engagement in
science and technology

System Overview



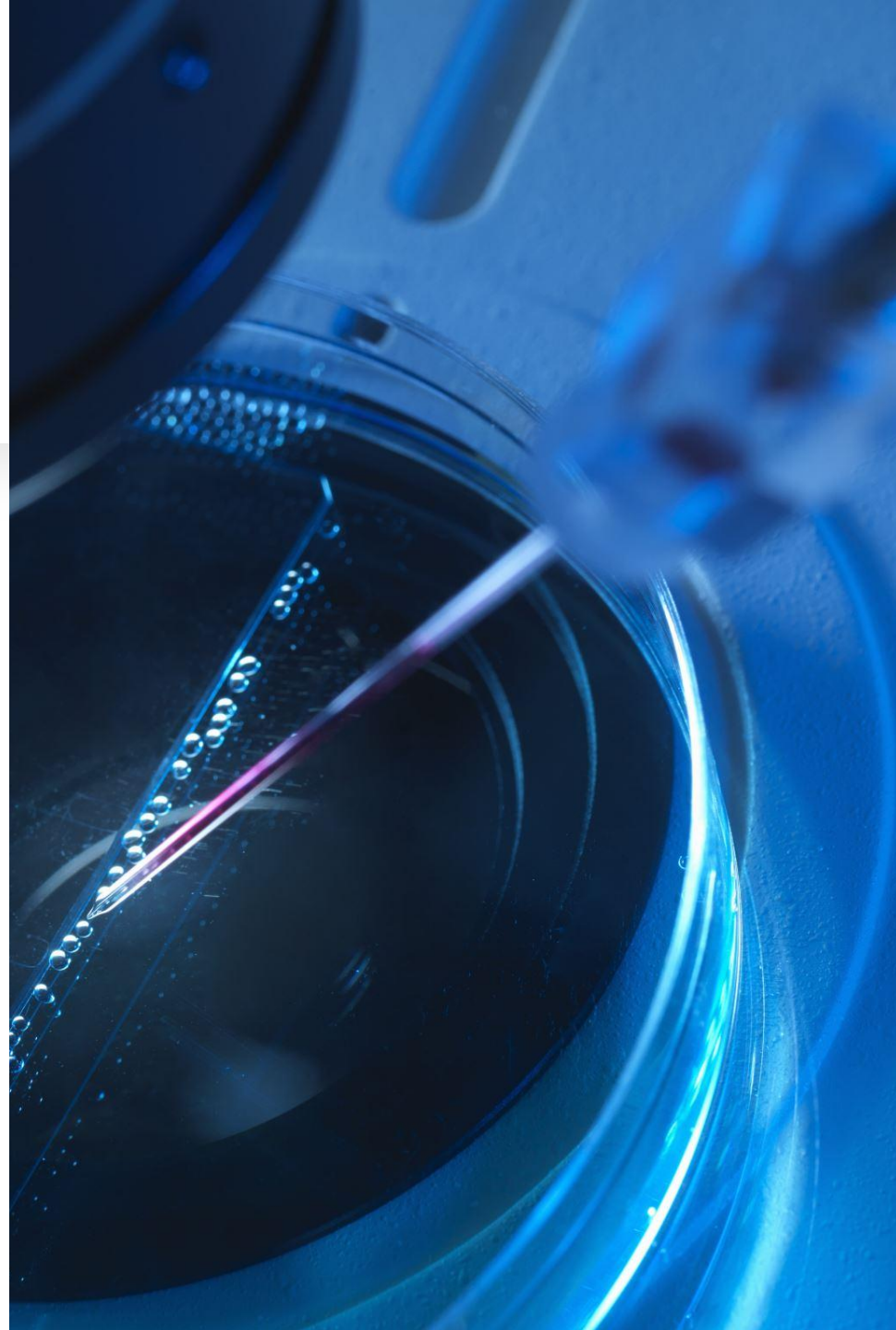
Hardware Components

- Reservoir, Water Pump, Grow Tray
- Lights, Air Pressure & Chemical S.



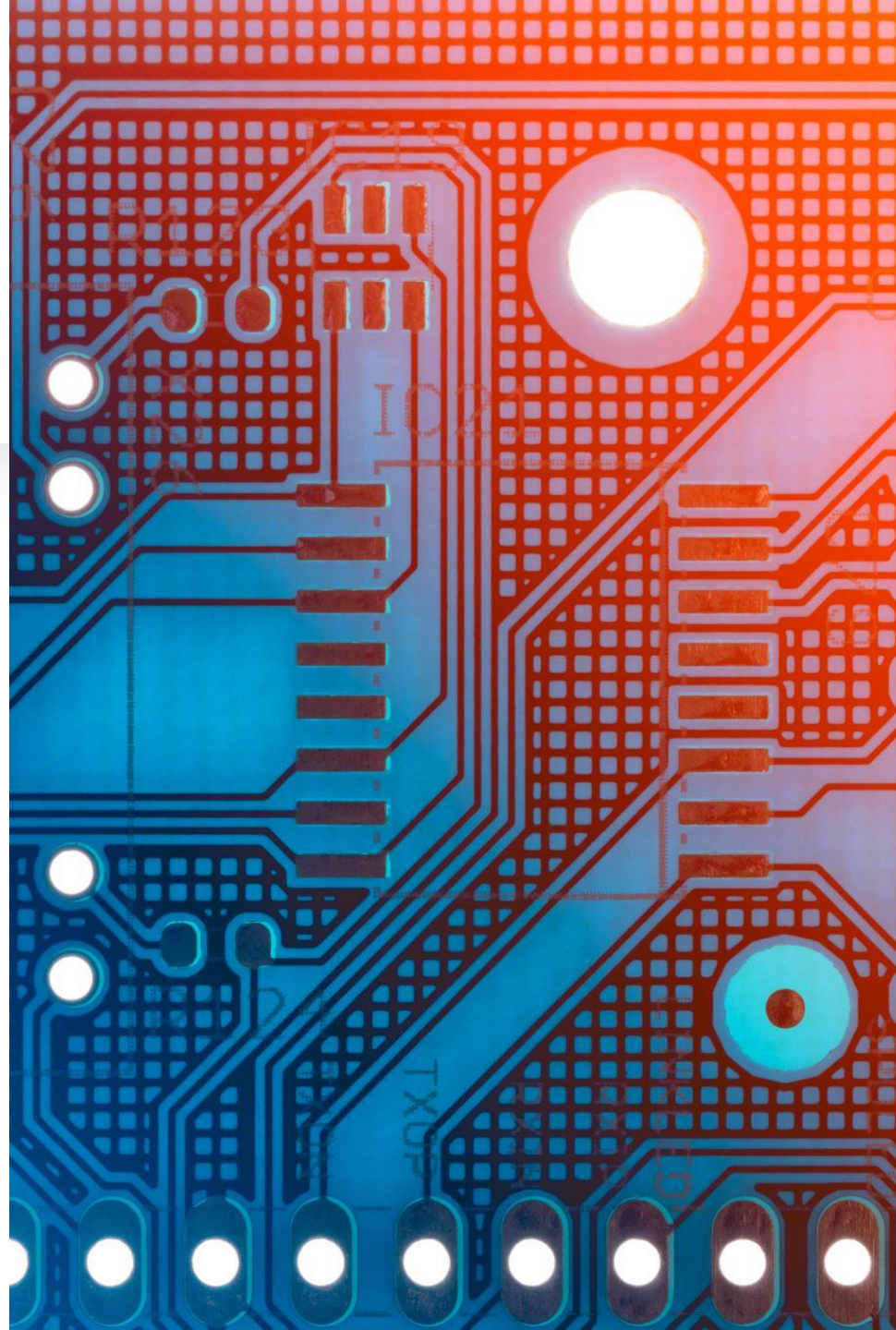
IoT Sensor Suite

- pH, Temperature & Humidity Sensors
- Water Level Sensor, CO₂ Sensor
- AI-enabled Camera Module



AI & IoT Control System

- Microcontroller:
ESP32/Raspberry Pi
- Wi-Fi & Bluetooth Connectivity
- AI-Powered Dashboard & Cloud Integration

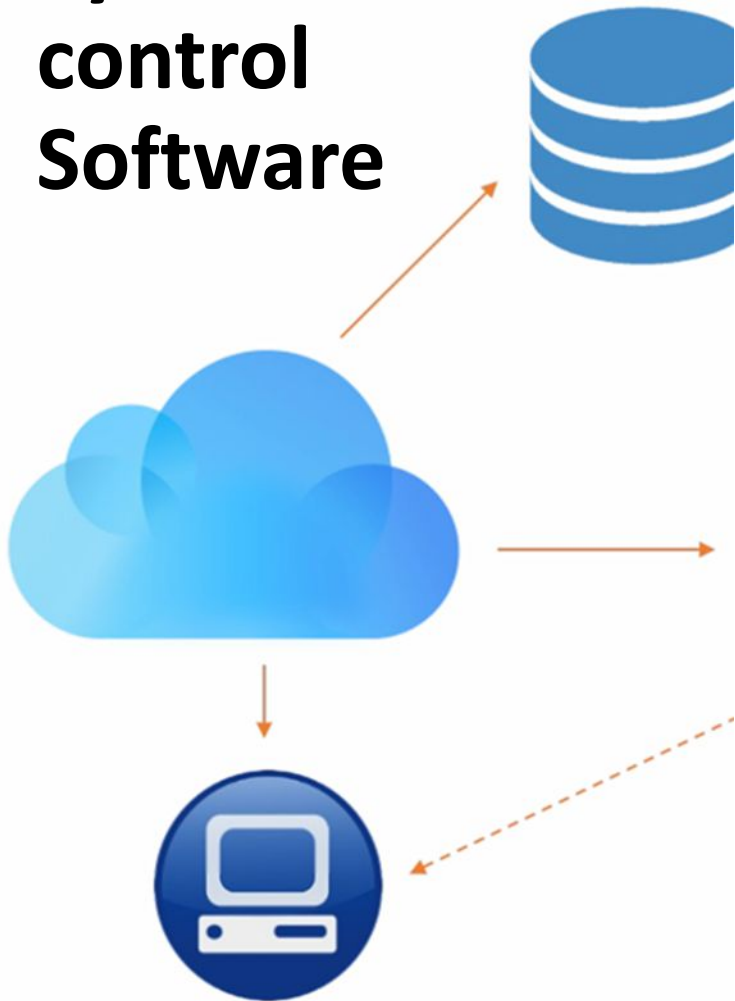


Conceptual Design



Data is pushed to the cloud and grouped by location, each location has a real-time feed that can be monitored thru the system Control software

System control Software



Data is pushed to the cloud and grouped by location, each location has a Realtime feed that can be monitored thru the system control software

System control Software

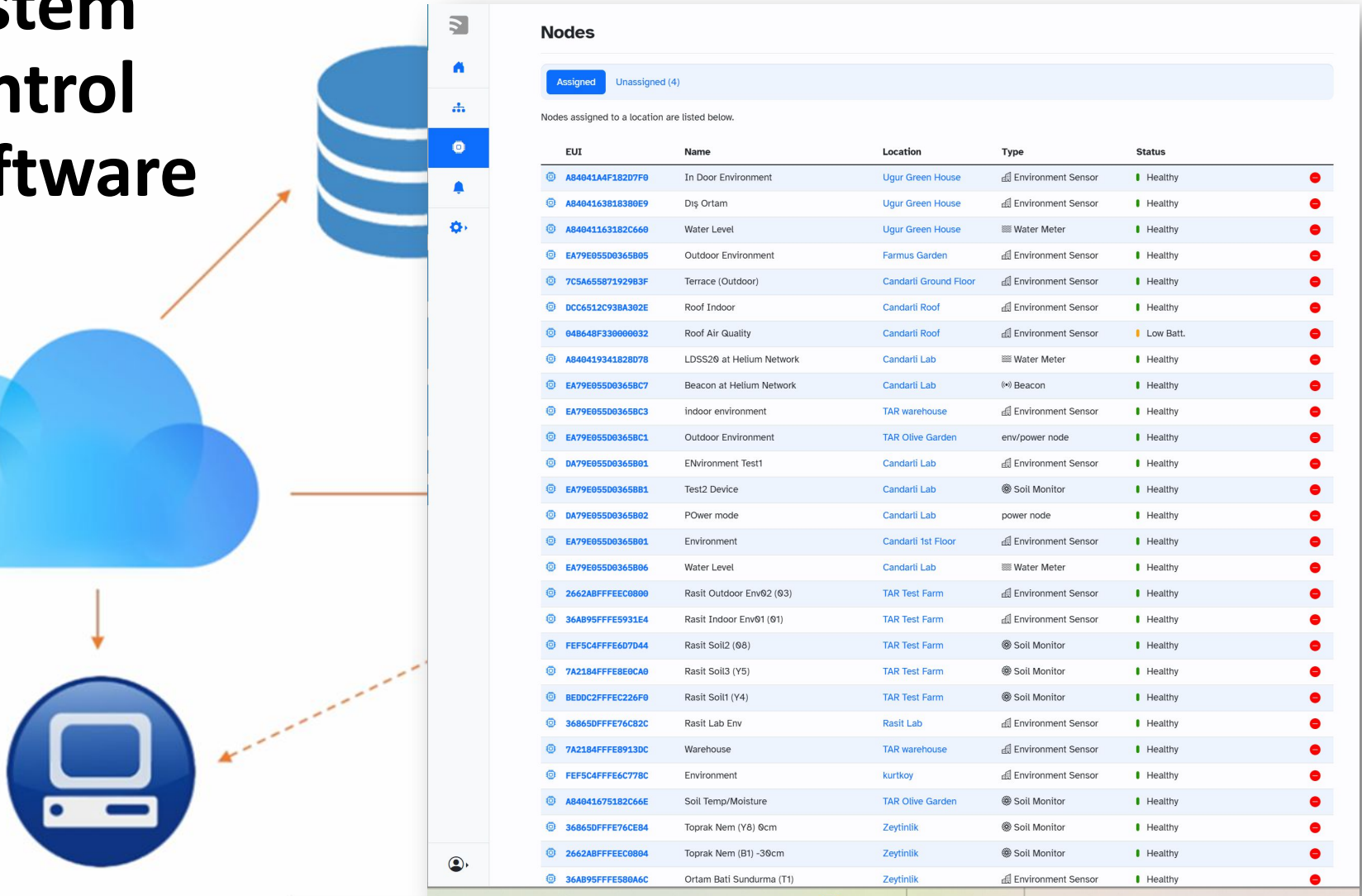


The screenshot displays the 'System Control Software' interface. It features a sidebar with navigation icons (home, users, settings, notifications, and a gear icon) and a main content area titled 'Select organization'. The main area lists several organizations and their associated locations, each with a user icon and a location name.

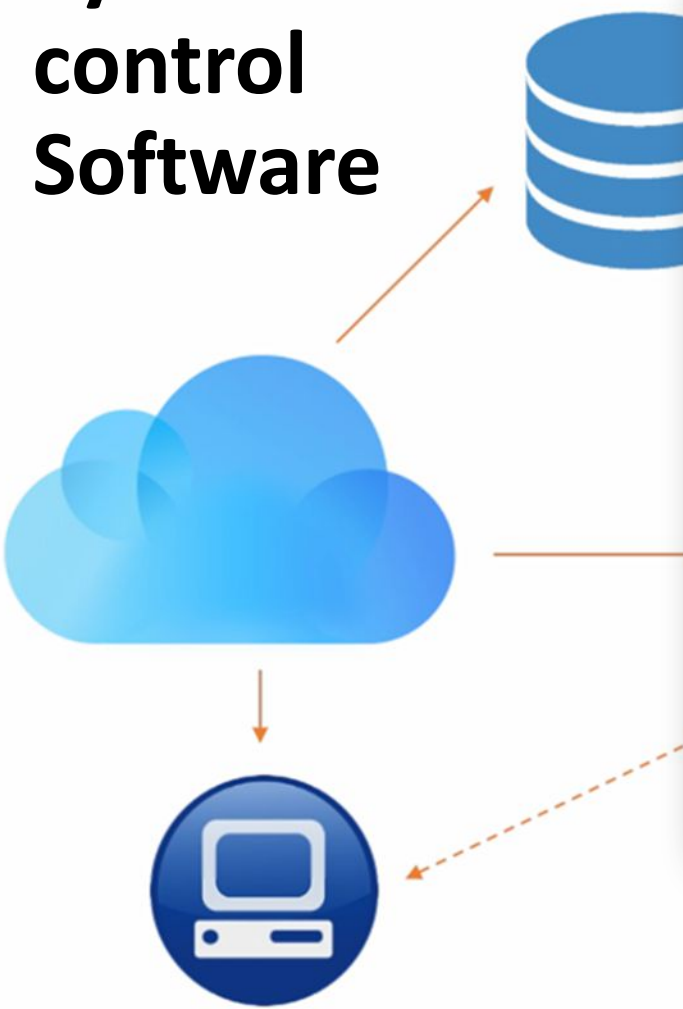
Organization	Location
Atesh's Farm	New York
	Çandarli
	Uğur Sera
Candarli House	Candarli Ground Floor
	Candarli 1st Floor
	Candarli Roof
	Candarli Lab
	Garden
	House Energy
TAR Olive Garden	House
	TAR Olive Garden
	Reha's Office
	Turkan's Workshop
	TAR warehouse
UGUR Green House	Ugur Green House
Farmus	Farmus Garden

All sensors are uniquely identified by the system

System control Software



System control Software



System control Software



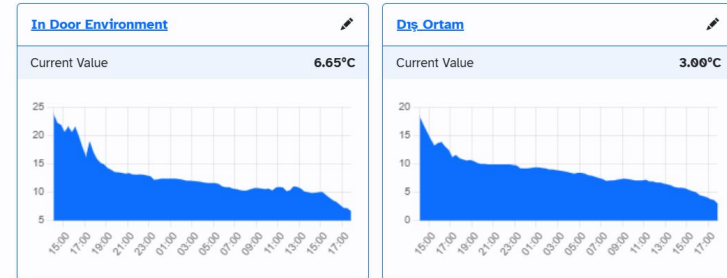
System control Software



[Home](#) > Ugur Green House

Next update in 11 seconds

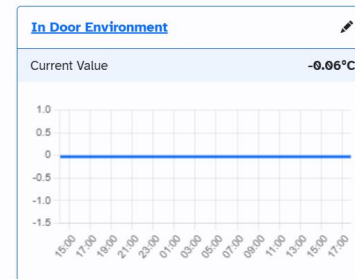
Temperature (temp)



Humidity (envhumidity)



Water Temperature (watertemp)



Educational Implementation

- DIY guides & hands-on activities
- Coding exercises & real-time data analysis
- Problem-based learning approach



Teacher Training & Curriculum Integration

- Training workshops, lesson plans
- Cross-disciplinary applications
- Capstone projects for student innovation



Expected Impact

PROMOTES
SUSTAINABILITY IN
EDUCATION

ENHANCES
STUDENT
ENGAGEMENT IN
STEM

ENCOURAGES IOT
AND AI ADOPTION
IN LEARNING