ESP32-Controlled Hydroponic System

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Background Facts: Traditional Farming

- Requires soil and needs to be outside
- Not all plants grow year-round
- Requires huge space
- Environmental conditions dependence
  - (climate.. etc)

- Economically efficient for mass production

What if I want to plant my household-scale vegetables and herbs, possibly some fruits?!

Traditional planting becomes more challenging an unaffordable

Project Statement

Providing Affordable Household Hydroponic System

Aimed User

Our system will be available for user with limited spaces, and conditions to be able to grow plants.

As a **primary focus,** the project will be set-up with growth data for **cooking ingredients vegetables and herbs.**
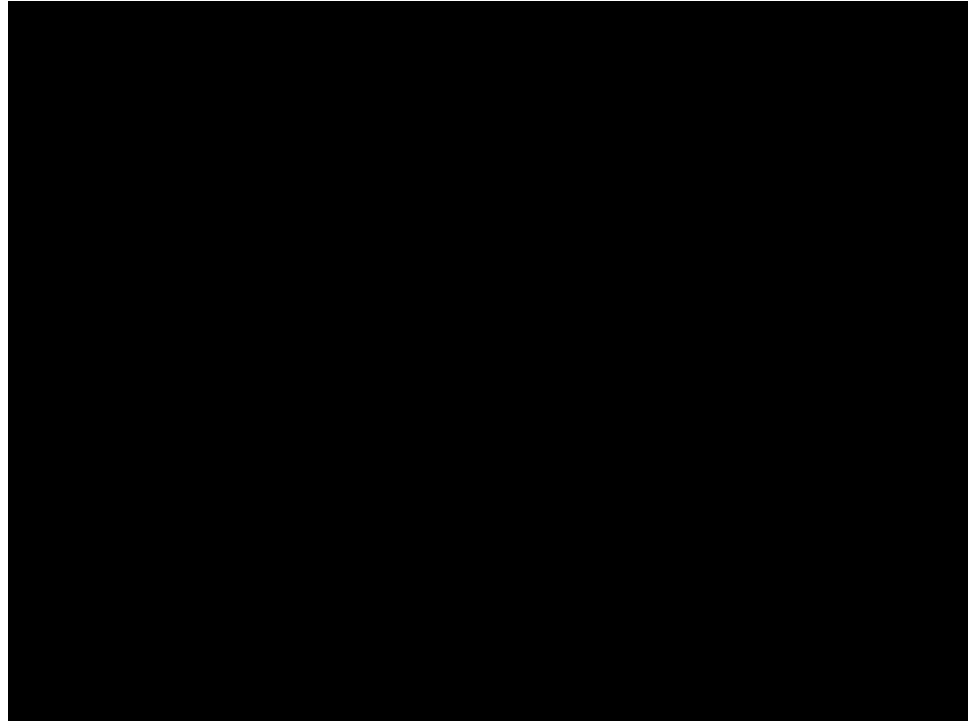
What is a Hydroponics system?

- Plant roots in direct contact with nutrient-rich water.

- Space and resource efficient.

- Able to grow nutritious crops.

- Applicable in non-traditional farming environments.

- Requires a lot more maintenance than traditional farming methods.

- High initial cost
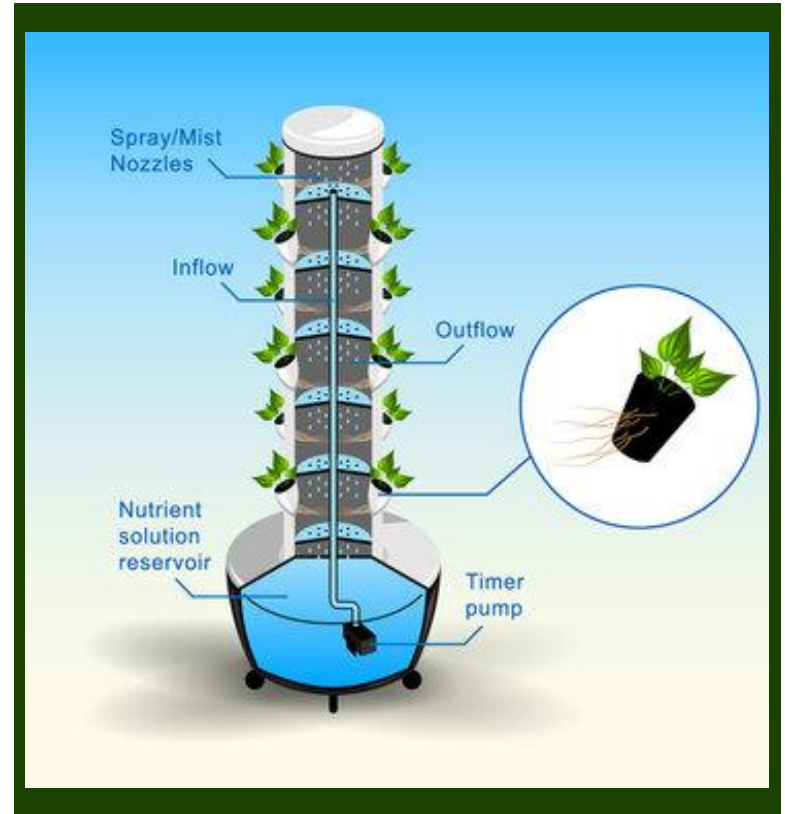
How Hydroponics work?

Low Pressure Aeroponics

- Plant roots suspended in open air, sprayed with nutrient-rich water.
- Better for crop yield over crop quality vs High Pressure Aeroponics.
- Lower water usage required vs hydroponics.
- Low Pressure leads to bigger water droplets, reduces plant oxygen intake.

Aeroponics

Mist Novels
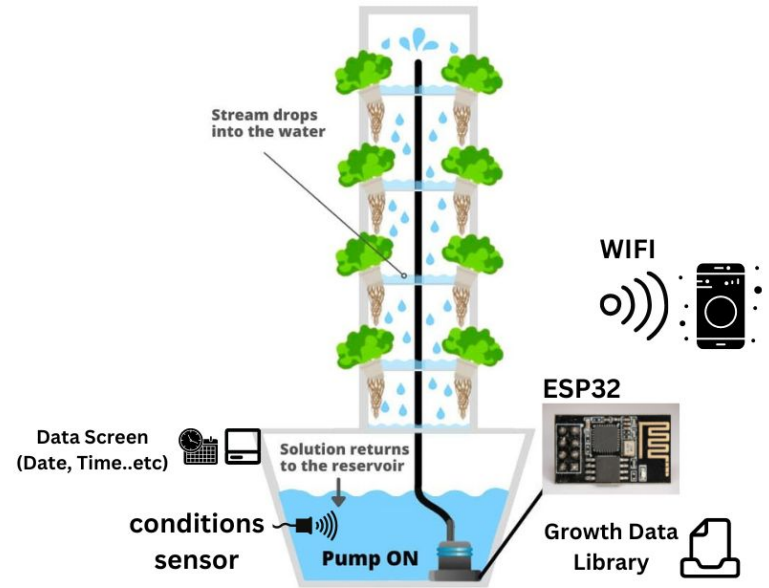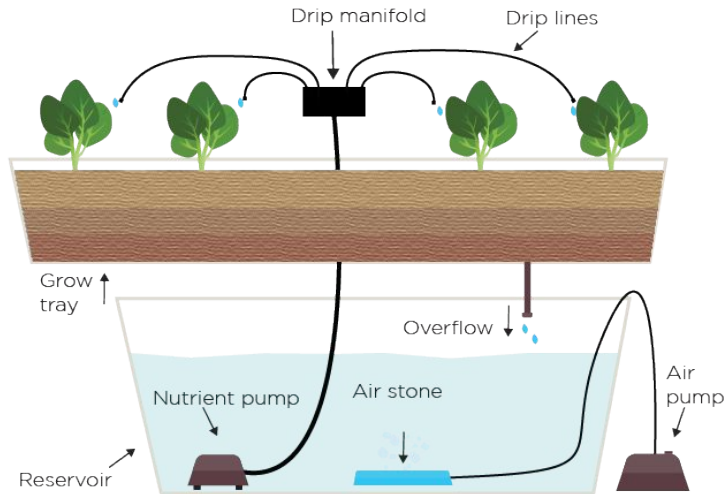
Nutrient Solution

Water Pump
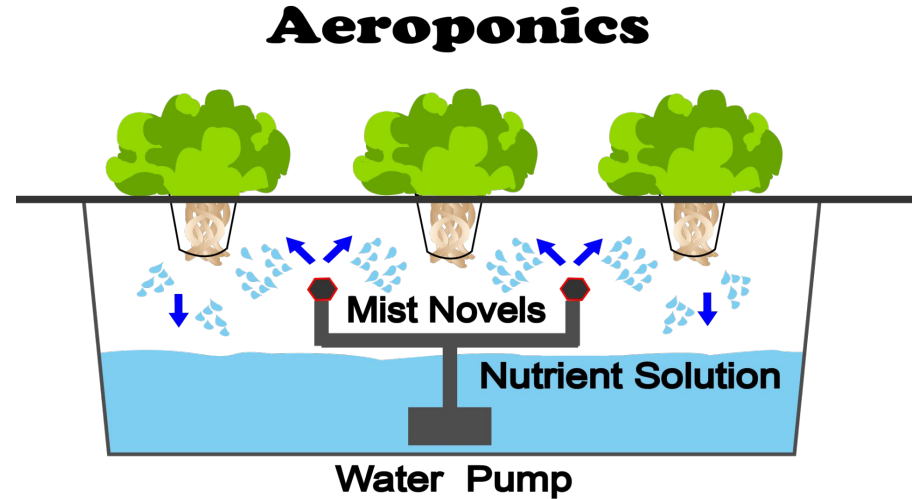
Excitement

Being able to work with biochemical balances within planets will be fascinating and finding automation to do that using your phone will be even better!

Being able to at least grow basic foodstuffs even in small quantities can reduce the environmental impact of society today.

Initial Design

- Vertical style as opposed to traditional

Drip manifold
Drip lines
Grow tray
Overflow
Nutrient pump
Air stone
Air pump
Reservoir

Stream drops into the water
WIFI
ESP32
Data Screen (Date, Time..etc)
Solution returns to the reservoir
conditions sensor
Pump ON
Growth Data Library

Foundation Requirements

- Self watering
- Modular

Backlog Items

- Portable
- Easy to produce
- Maintain growth conditions using sensors
- Allow user to Read data through wifi connection
- Sustainability
- Aeroponics

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Project Timeline

- Figure out Materials and costs
- 3D modeling and blueprint sketches
- Interviewing people/ideal market
- Build Functioning Prototype
- Test ESP32 and Wifi connections
- Finish project

Gantt Chart

- Five stages to complete the project
- Sets up 8 weeks working frame (TBD)
- Tracks progress and task dependencies
- Allows changes and project refinements

LINK TO FULL IMAGE

Possible Difficulties

- Wifi Connections with ESP32
- Mounting Electronics near a water tight storage
- Keeping costs down
- Power Supply Issues

Conclusion

Hydroponic and aeroponic systems are the future of farming, increasing crop growth efficiency and crop yield. However, they require precise information about plants' nutritional needs, timing, and maintenance to produce healthy crops. The better the tech, the easier it is to maintain.

Questions