ZotPonics: A Smart and Scalable Hydroponics System

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BACKGROUND

We are faced with a future where there will not be enough land to produce food for the entire population. By 2050, the world population is projected to increase to about 9 billion people[2]. However, an estimated 50% of the world's arable land may be unusable by then, as traditional agricultural practices in the last 50 years have left 60% of all ecosystems degraded[2].

In an effort to mitigate these issues, producers are increasingly interested in controlled environment agriculture, especially in regions where there are concerns about soil and groundwater pollution[1]. One promising solution is hydroponics, a highly productive, resource-efficient, and eco-friendly alternative to traditional farming[1].

PROJECT GOAL

ZotPonics is an automated indoor hydroponics system that allows users to grow plants inside their homes. The farm will automatically distribute water to plants and maintain specified growing conditions. Our system will also include a mobile app allowing users to monitor and control the farm as well as notifying the user when human intervention is required.

REFERENCES

1. Jensen, Merle H. "Hydroponics." HortScience, vol. 32, no. 6, Oct. 1997, pp. 1018–1021., doi:10.21273/hortsci.32.6.1018.
2. Okemwa, Ezekiel. "EFFECTIVENESS OF AQUAPONIC AND HYDROPONIC GARDENING TO TRADITIONAL GARDENING." *International Journal of Scientific Research and Innovative Technology*, vol. 2, no. 12, Dec. 2015, pp. 21–52., http://www.ijsrit.com/uploaded_all_files/3563230518_m3.pdf.

DIAGRAMS

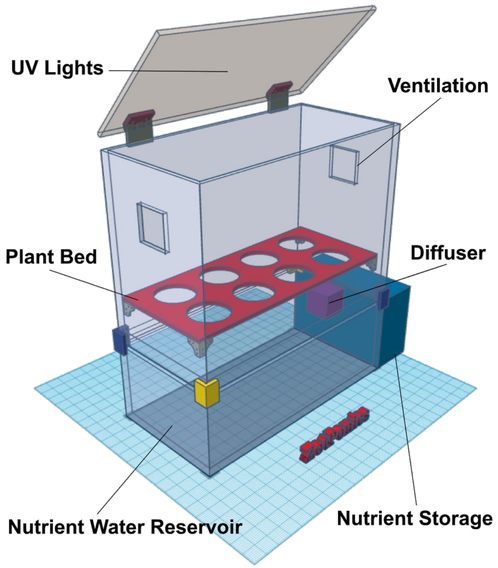

Figure 1. Structural Diagram

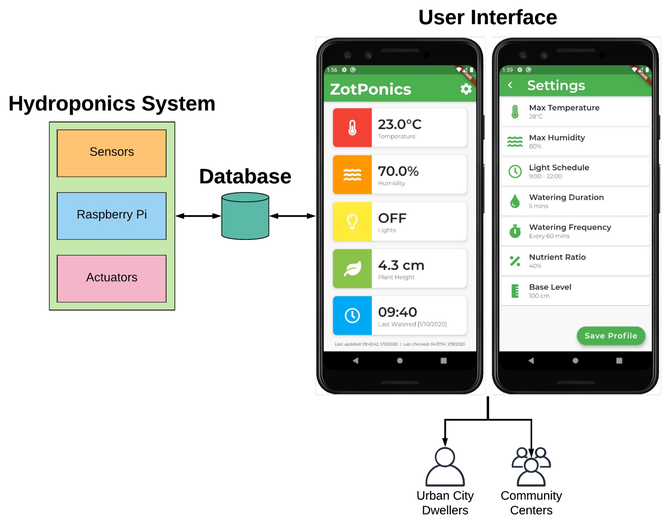

Figure 2. Systems Diagram

MATERIALS NEEDED

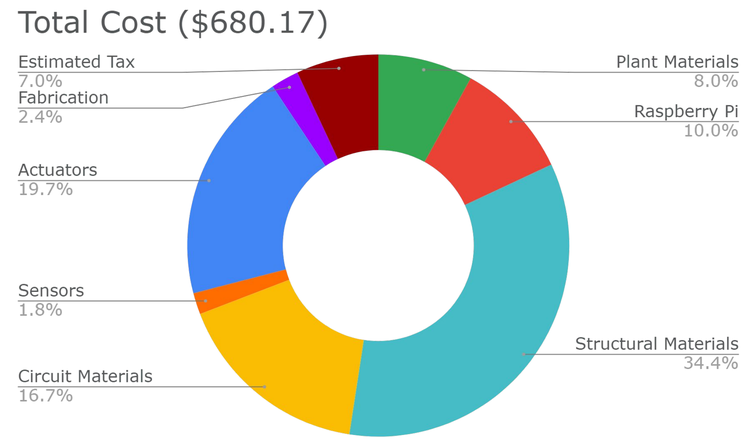

Figure 3. Cost Distribution

MILESTONES

Fall

W1: Discuss project design and features
W2: Develop structural/electrical/software design plans
W3-6: Code/test system design logic
W7: Finalize list of materials and submit purchases
W8: Complete laser cutting/3D print designs
W9-10: Finalize/review all designs and code

Winter

W1-2: Fabricate structural design
W3: Attach sensors and actuators to structure
W4-5: Solder and wire up electronics to Raspberry Pi
W6-8: Test hydroponics system and resolve any issues
W9: Prepare documentation and presentation
W10: Finalize/review documentation and presentation