

Developing an Aquaponics Interface

Justin Bare
University of Washington

Laurel Hart
University of Washington
hart1a@uw.edu

Sam Wilson
University of Washington

ABSTRACT

Abstract.

Author Keywords

Aquaponics; sustainability; value sensitive design;

ACM Classification Keywords

H.5.2. Information Interfaces and Presentation: User Interfaces

INTRODUCTION

This paper documents the process of designing an interface for monitoring and controlling

RELATED WORK

Aquaponics
See Figure 1.

Value Sensitive Design
Blah [2][3]

METHODS

Intro to methods

Value Sensitive Design

Some stuff about VSD

Although we identified an extensive list of potential stakeholders, we decided to focus on only a few principle ones (see Table 1).

Direct Stakeholders

Indirect Stakeholders

Initially, the intent of our investigation was to design an interface that addressed the needs of both direct and indirect stakeholders. The intuition was that the information used by system managers to monitor the operations of the aquaponics system could also be used to assess its sustainability.

Iterative Design

D3.js: [1]

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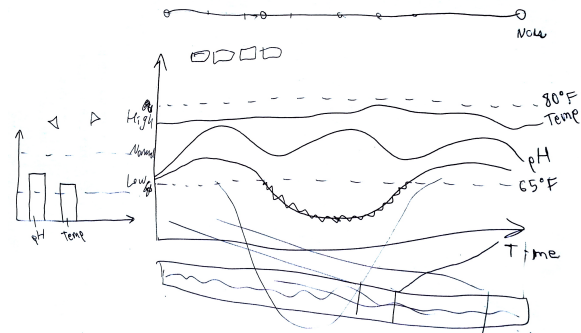


Figure 2. Initial sketch in response to system manager's desire to see all information at a glance.

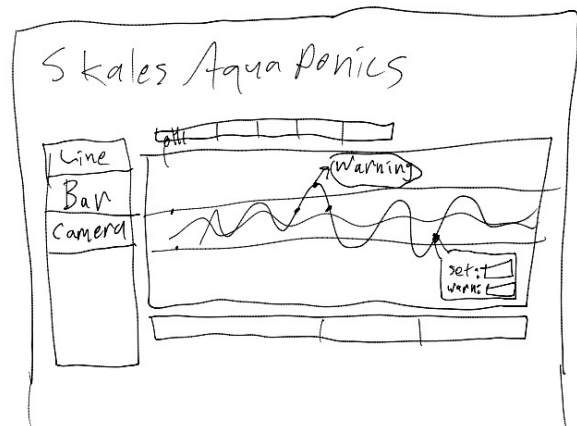


Figure 3. Refinement upon first sketch.

RESULTS

Out design efforts resulted in a live prototype.¹

FUTURE WORK

Additional Stakeholders

Although the original list of stakeholders was thought to be extensive—including everyone who could conceivably be influenced by the aquaponics system or its interface—an interview with Batya Friedman revealed a particular bias: only humans were considered as stakeholders. The fish living in the aquaponics system, possibly the most direct stakeholder of all, had been overlooked.

Another insight Friedman provided was the consideration of how to handle hardware aging.

¹Accessible for the foreseeable future at <http://homes.cs.washington.edu/~samw11/510/>

Direct Stakeholders	Benefits/Harms	Values	Conflicts
System managers	<u>Benefits:</u> Able to fix problems more quickly <u>Benefit or harm:</u> Less time doing maintenance and tending plants by hand <u>Harm:</u> Could be alerted of emergencies at any time	Human welfare Autonomy Calmness Free time away from work Interaction with nature Physical interaction with systems Awareness (of system functioning)	Physical interaction with systems and awareness may conflict with calmness and free time away from work
Indirect Stakeholders	Benefits/Harms	Values	Conflicts
Restaurants and restaurant customers	<u>Benefits:</u> Know about where their food comes from Provide feedbacks or improvements to owner <u>Harms:</u> Could be lied to if presented with false information	Trust Accountability Environmental sustainability Autonomy Ownership and property (restaurants)	Ownership and property (in the form of profitability) may compete with environmental sustainability

Table 1. Paired down list of stakeholders

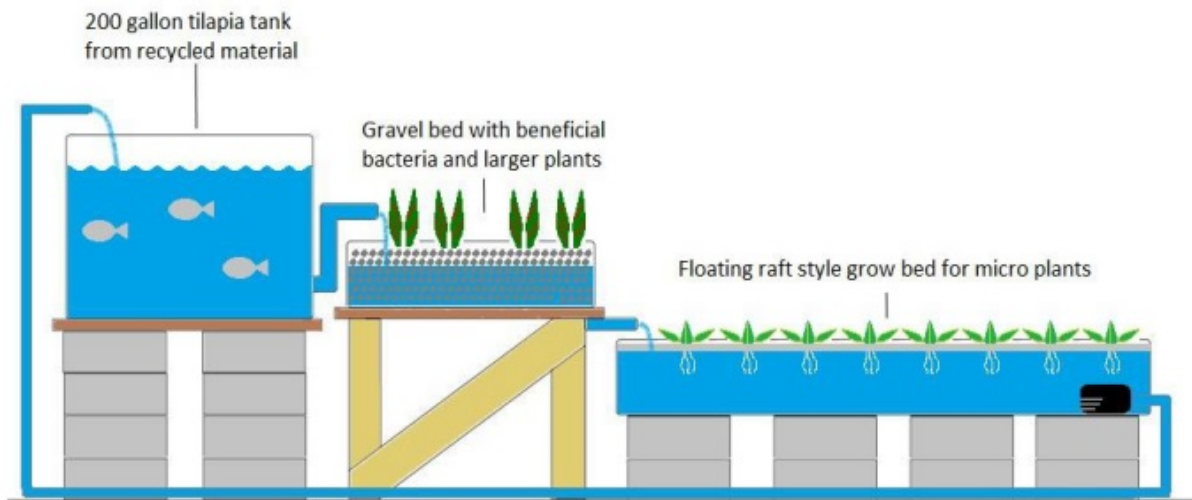
Other extensions to this interface include moving from a passive, monitoring role to being able to actively control certain functions in response to the incoming data, e.g., remotely activating

CONCLUSION

Blah

REFERENCES

1. D3.js - Data-Driven Documents. <http://d3js.org/>.
2. Friedman, B., Kahn, Jr., P. H., and Borning, A. "Value Sensitive Design and Information Systems". *Human-Computer Interaction and Management Information Systems: Foundations* (2006).
3. Kahn, P. Chapter 5: Structural-developmental methods. In *The human relationship with nature: Development and culture*, The MIT Press (1999), 77–93.



The Skales Prototype includes (from left to right): a 200 gallon tank where tilapia are raised, a grow bed with gravel media and microorganisms to process the fish waste into fertilizer, and a floating raft bed ideal for growing micro-greens and herbs. A recirculating pump will return the water to the fish tank.

Figure 1. Skales Cooperative aquaponics system

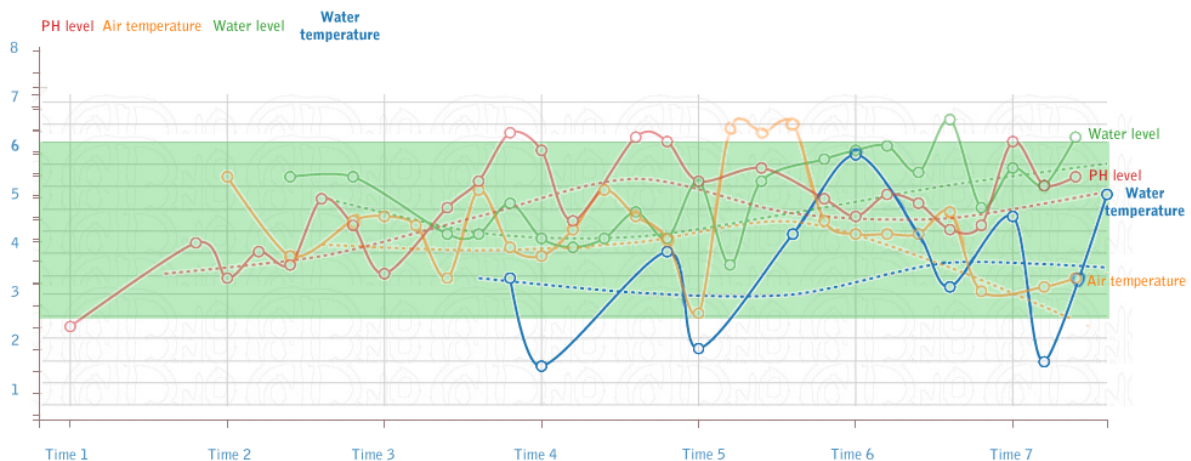


Figure 4. Color mockup based on D3.js aesthetics.