GNG1103 - Deliverable F: Prototype I & Customer Feedback

Hydroponics

Group B4

Introduction

The purpose of this deliverable is to take our conceptual designs and turn them into a physical representation. The first prototype is supposed to provide insight on the scale and dimensions of the system, and to gauge whether the system is feasible. The deliverable shall also include a simple analysis of the critical components of the system.

Our first prototype

A top view of the system without the planting pots added.The drainage valve can be seen on the left side.

A side view showing the pump and the tubing leading into the reservoir to supply air to the air stones.

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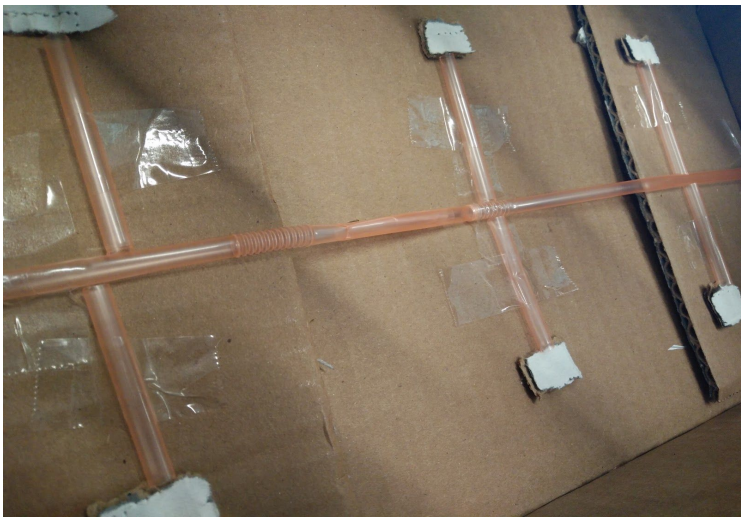

A view of the inside of the reservoir. 6 Air stones are connected to the pump by tubing and T-connectors.

For water to reach each plant, holes were added to the bottom of each planting pot.

A view of the complete system with the planting pots included.

Analysis and Testing

Due to the simple, no moving parts design of our first prototype, there are not many ways that one can test the prototype for functionality. The prototype did provide a 3D representation of our system, as opposed to the 2D representation of our design sketches from the previous deliverable. We were given an idea of the scale of the solution and where certain components of the system, such as the air stones and planting pots, had to be relative to other parts of the system.

The simple design did help foster discussion about what would be required for the fully functional, full-scale solution. Firstly, it was noted that the air pump would have to be raised above the water level so that water does not drain in reverse through the air hose and destroy the pump. Another design feature that was discussed were the air stones. In our first prototype we had 6 air stones. Seeing as our conceptual design suggested between 18-24 plants, it would require lots of tubing and air stones if our full design was to have an airstone per plant. It was discussed that fewer large air stones could simplify design. The draining method for our reservoir was also discussed after analysing our prototype. With a flat bottom some water would remain stationary at the bottom of the reservoir, even after draining. To fix this, it was posited that if the bottom of the reservoir had a slight slope leading down to the drainage valve, then complete draining would be more effective.

Conclusion

Our first prototype was a low comprehensive physical prototype. Because of the lack of working mechanisms, it was hard to test functionality for our final prototype. However, this prototype allowed us to have a better picture of what our final prototype would represent, and was a catalyst discussion about future challenges that we may face with our design.