Deliverable G-Prototype II and Customer Feedback

University of Ottawa

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Table of Contents

Prototype Objective

The objective of this second prototype is to effectively communicate our design modifications following feedback from the first prototype. Having obtained feedback on this second model, we aim to apply the suggestions to our final design, especially with regards to critical animal and weather proofing strategies. The size and materials used to build this prototype will help us minimize costs while accurately representing a potential final design. The change in materials for the prototype reflects the poor physical properties of paper and the more robust materials used in the final design.

Prototype Images

I. SolidWorks Model

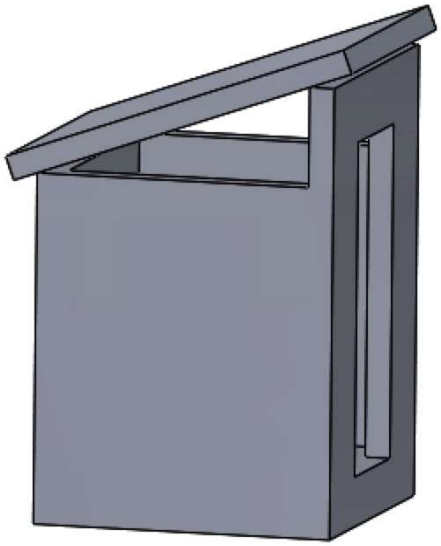


Figure 1. Side view

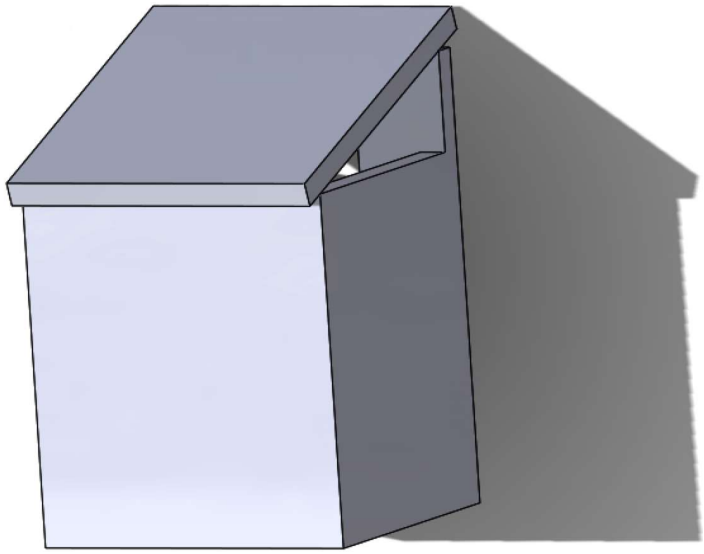
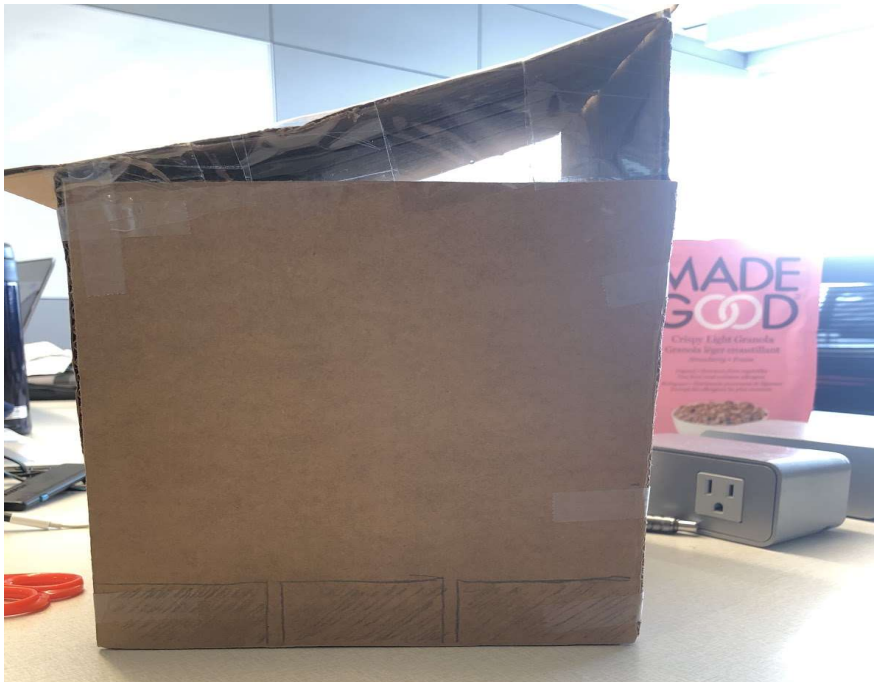
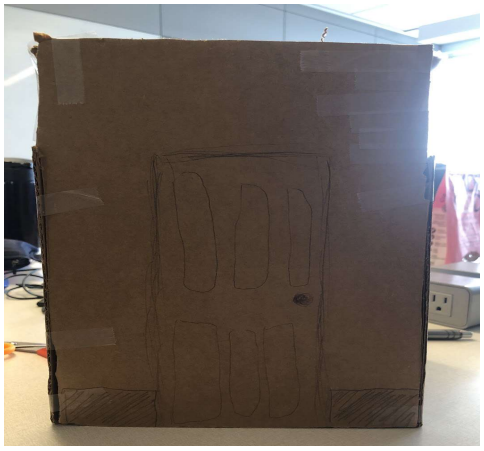


Figure 2. Back view

II. Cardboard Model





Prototyping Process

In order to build the physical model, cardboard was carefully selected for its availability and inexpensiveness as well as ease of construction. These qualities make it easy to reproduce. The cardboard was cut into proportional shapes and put together using tape and glue where nails would be placed to mimic the behaviour of screws and nails holding the supports in place. The roof was taped to the top, as opposed to the previous prototype, in order to ensure strong winds and impacts could be withstood. This makes it a high fidelity design. Elements such as the doorway were drawn, as well as concrete blocks we believe would be effective against rodents

and small animals. Testing consisted of using a strong fan, mirroring the effects of wind on the structure. A second prototype was also built, and these were thrown at each other to test for impact resistance.

Testing and Feedback

The second prototype did much better facing strong wind simulation, as no deformation was noted and the roof did not slide, anchored to the structure with tape and glue. We believe this also provided torsion resistance for the walls. In the impact resistance test, neither model suffered any damage, which suggests our full-scale greenhouse, using even more rigid materials and connections such as wood, nails and screws, will be resistant to important impacts. Our client was in favour of using cement as a rodent-proofing strategy, however any barrier can only be effective up to a certain height, after which the vinyl must be clear to let sunlight in. Any barrier will therefore only be effective against small rodents, and must be difficult to climb.

Conclusion

In all, we can consider this second prototype a success, as it has helped us and our client further understand our design when it comes to sense of space and performance limitations. We are keenly aware of the limitations regarding resistance to animals, and we've come to believe a wire mesh will be less tempting to climb and less appealing to animals than concrete slabs, so this system will be prioritized. Further, this second prototype is proportionate to our final design and gives us a better idea of proportions and usable space. We will remain in communication with our client as we finalize design elements and will seek their feedback and approval along the way.