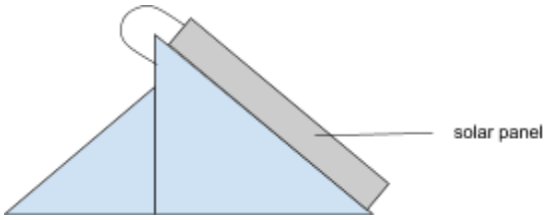
Project Deliverable F: Prototype I and Customer Feedback
GNG 1103 – Engineering Design
Faculty of Engineering – University of Ottawa

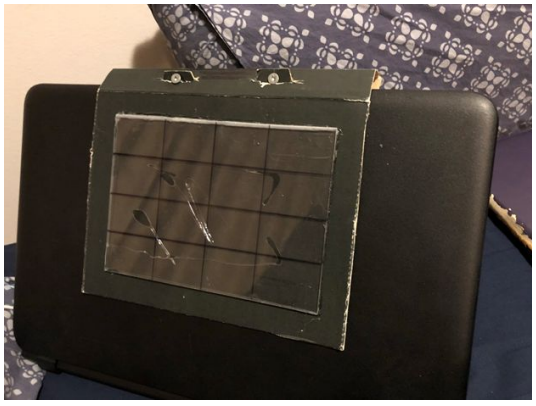
Introduction:

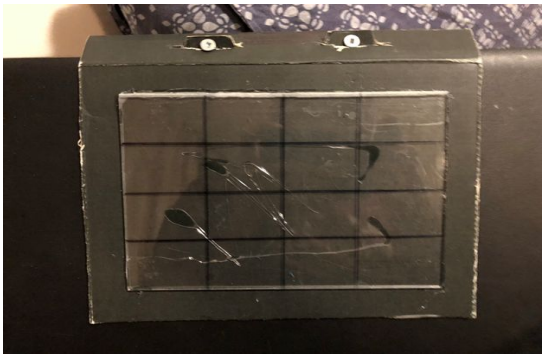
Our team has been asked to come up with a plan to mount a solar panel that will generate enough energy to provide a modular net zero house with sufficient electricity and heat, while the mounting system being easily extendable when needed. After conceptualizing our design, we built a prototype to visually represent our design and ideas. A low cost Prototype I has been constructed with the material in hand to make it easy for the client to conceptualize the design which will allow us to receive constructive feedback, hence enhance the project.

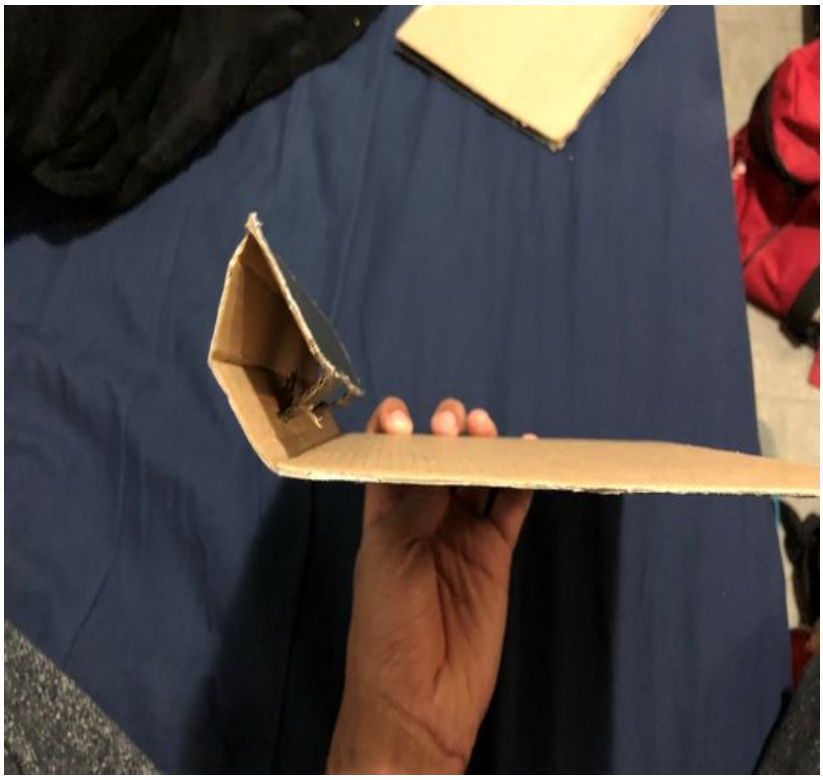
PLAN & PROOF



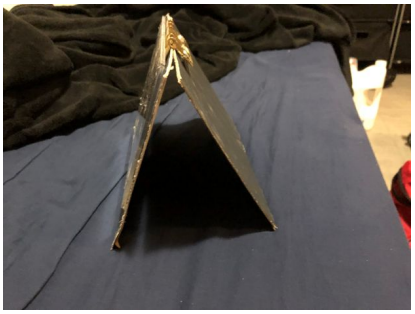
Design 1:







Design 2



TEST FEEDBACKS

Problem faced	Details	Proposed Solutions	Chosen
With heavy wind, the solar panel would be unstable from the bottom since there are no bolts holding it down at the bottom (non-penetrative system)	Upon speaking with the prof, we have decided that while a completely non-penetrative system is ideal, it is not necessarily possible with the given circumstances. It risks being unstable, especially in harsh Canadian weather.	1. Bolt the bottom of the solar panel to the roof in the same way that the top of the solar panel is latched to the roof. 2. Mount the solar panel using a system similar to that of a razor blade cover; the solar panel slides in from the side, restricting vertical movement, and then it is bolted from the top and bottom onto the roof's frame like a latch,	2

		therefore also restricting horizontal mouvement. The razor blade cover system allows for a less penetrative system.	
How would the solar panel latch onto the roof if the solar panel is larger than the roof itself?	After communicating with the construction team about this, we've decided to make a one-sided tilted roof, allowing for a bigger roof area.	1. Extend the roof (with its mounting) system to fit exactly the size of the solar panel (164 cm x 98 cm), even if it means having an extremely long roof.	1

MATERIALIZED AND STOPPING CRITERIA

Prototype 1 is made up of mini solar panel that has been glued to a cardboard roof. There is also a hinge

What:

In order to visualize and test our design for the mounting of the solar panel, we constructed Prototype I out of cardboard, plastic and some metal parts. This prototype represents the way the solar panel will be attached to the roof on a much smaller scale. We originally made two prototypes as both ideas received good feedback from the customer, but some limitations were discovered for one of them which will be discussed later in this document. One prototype uses the idea of having sort of a door hinge in the intersection of the sides of the roof, while the other uses a latching system on the top edge of the roof. Both of these ideas were recognized by the customer for being non-penetrative and easily extendable.

Why & Changes Made After Feedback:

The prototype that involved a metal door hinge on top was found to be complicated due to the fact that we would need a very strong adhesive to hold the hinge in between the two sides of the roof. After discussing it with the construction team and see their original plan for a one sided roof, we took out this option and focused on our other prototype that is based on the idea of having a hinge/latch system on the sharp end of the rooftop. The first feedback we received from the professor was to account for the heavy wind that we experience during winter time. As we recently witnessed a large scale snowstorm in the city with high winds up to 60 km/h, he told us to secure the bottom of the panel as well for which we thought gravity and the slope of the roof would be enough to stabilize the panel. After the client raised the same concern, we decided to use the same system (latching system) on the bottom of the roof. By implicating the same hook system on the bottom of the mounting system as well, it will provide a more stable system overall. It will provide a solution to the force of wind from all angles, by still staying true to one of our groups primary selling points: a mounting system which is easily installed. Using

this system requires a slight protrusion on both edges of the roof, which allows the solar panel mount to latch onto the roof and stay secured.

When:

We started working on these prototypes after meeting with the client and presenting her different mounting system options in the lab (February 27th). With the feedback we received both in the lab and in the lecture on Friday (March 8th), we have now started building our Prototype II.

Conclusion:

Upon discussing with the client, project leader, and the professor, our group understood the importance of the implication of a functioning informal prototype before moving forward. Our team understood that in order to proceed with our project, it is imperative to obtain constructive criticism on design concepts, allowing room for growth. By being presented possible scenarios that can hinder/affect our overall design, it allowed our team to think fast on our feet, and change our design for the better, and solve the problems presented to us. More specifically, we were able to modify our previous ‘one hinge’ design, to a ‘razor guard hinge’ mounting system, that solved the wind problem presented to us, while still maintaining easy installation and relatively non-penetrative properties (only if requested or needed).