**GNG1103 Project**

Group A12

Professor David Knox

Deliverable H

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Tarek Bedair

Benton Qiu

Mashiyat Islam

Joshua Lai

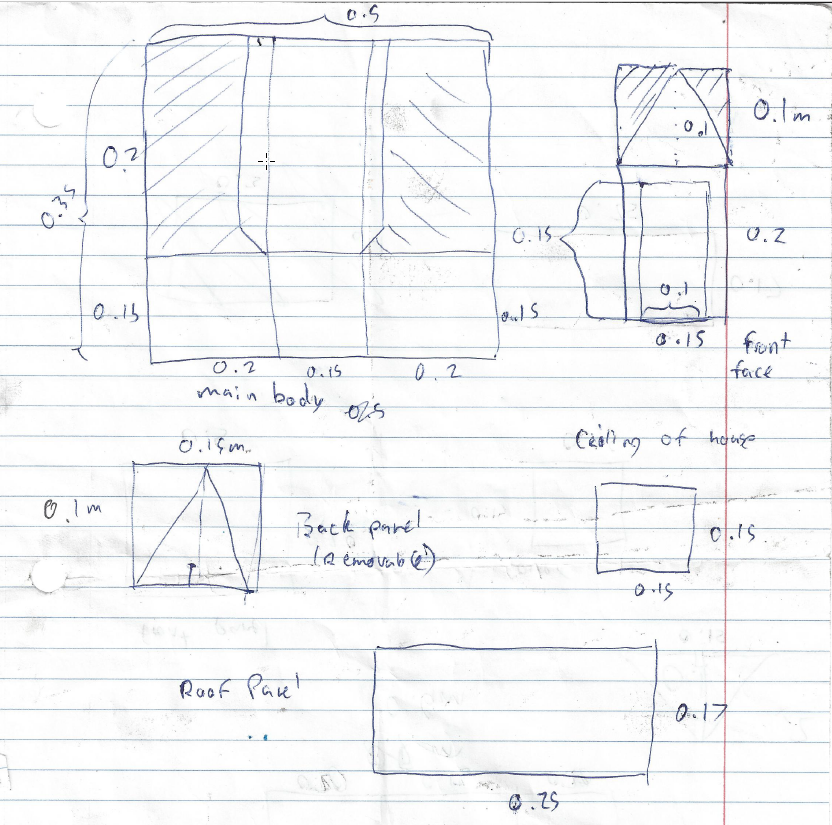
Ali Zaidi

Prototype 3: Final Design

Purpose:

* To address Erin’s concerns about our previous designs
* To determine if our choice of material was appropriate
* Develop strategies to put our design together
* Test out the charging functionality

After talking to Erin about our prototype, we had to make some somewhat significant changes to our design. Specifically the way in which we will be charging Bowie, and our choice of material.

The main concerns that were raised by Erin, was the security of design and the efficiency of conductive or wireless charging. In regards to security, she was concerned that our choice of PLA was not a good one for the main body of the station. PLA being very brittle and easily broken, regardless of its thickness would allow people to easily break our station and gain easy access to Bowie, something that Erin would be very displeased with. To combat this, we decided to change out the PLA for 22 gauge welding steel, which is easily available to us from our MakerSpace or any hardware store, and is something we all have experience working with. To put the design together, we decided to go with a combination of sheet metal screws and spot-welding. We worked together to find ideal dimensions for the sheets of steel we would be using and came up with the following sketch. (All dimensions shown are in metres)

We then took action and cut the metal to the correct sizes and began assembling the design.

This is the final result of the metal forming process:



Due to some poor planning and lack of experience, the design didn’t come out as good as we hoped. Given some more time, and more opportunities to experiment with sheet metal we could have produced a much higher quality product. The main issues with this prototype right now, is that it's not perfectly weather resistant, and that the ends of the sheet screws are exposed. In the future, we would apply waterproofing spray to any potential problem areas for water, and use rivets instead of sheet screws.

We decided to use a double-sided sticky tape to mount the solar panel on to the roof. Wires from the solar panels will go to 2 metal plates which represent the positive and negative contacts of the circuit. When the robot goes into the house two contacts from the robot will go and touch the contacts in the house, completing the circuit and thus charging the batteries. Unfortunately, we did not receive the solar panel in time to have it for this prototype. Instead we used a portable charging pack in its place.

To test the charging functionality, we used the charging pack and a phone to demonstrate how Bowie might use our design. It worked quite well, but some modifications will need to be made for the final design, to ensure that the cable within the station doesn’t move.

**General Improvements:**

* Much more secure than previous designs
* Somewhat weather resistant, improvements need to be made
* Much better functionality than previous designs
* Is capable of withstanding a greater amount of force

**Still Needs:**

* A way to secure and lock the Bowie into the design
* Full weather protection
* Aesthetics and looks
* Needs to made to the actual dimensions

**sTest Results:**

|  |  |  |
| --- | --- | --- |
| Criteria | Results | Testing objectives |
| Battery charging |  | 5 hours |
| Circuit functionality | Yes | Circuit works |
| Durability of Station | After dropping the design a few times, we have determined that it’s quite durable. | Will be able to withstand a reasonable amount of force |
| Weather resistance |  | Should not rust and should be able to withstand different environmental conditions |