GNG1103

Engineering Design

Deliverable D

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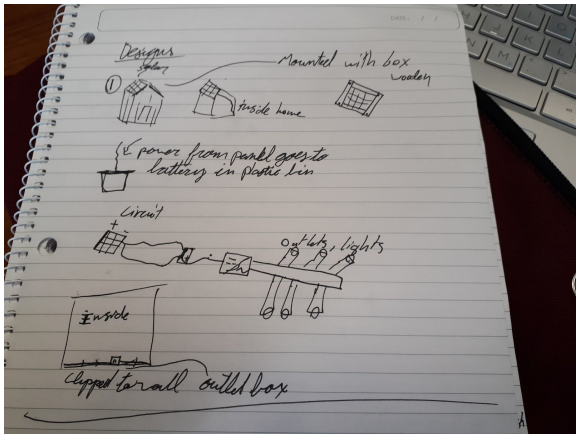
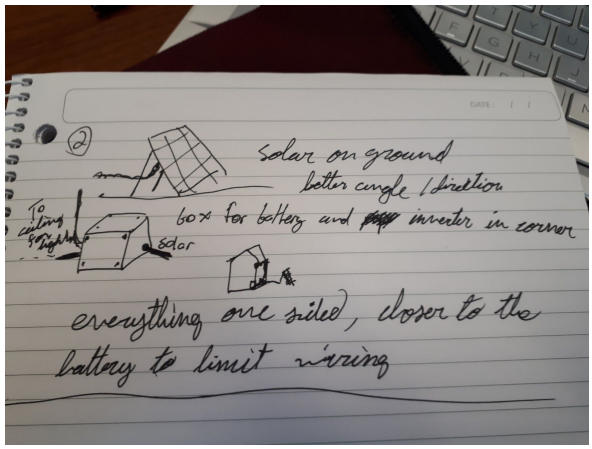
Conceptual Design

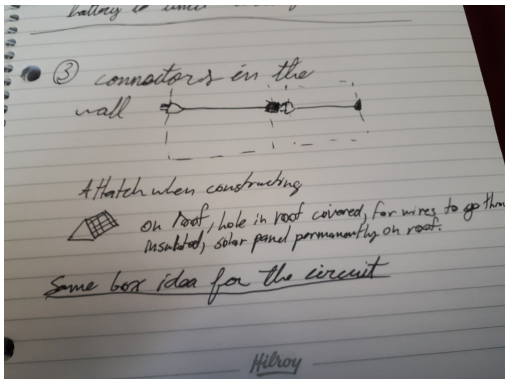
This document is an assembly of each of the group members' conceptual solutions to the problem of providing a portable modular home with a safe solar power system that is easy to set up. The solutions are discussed and three final concepts are generated. These concepts are scored in a decision matrix to see which one provides the best solution to the problem at hand. The solution that is decided to be the best will be further developed in the future. This concept generation process gives the team a better understanding of the depth of the problem that is being solved, as well as gives the group a clear idea of what needs to be done to complete the project and provides a solution that meets the requirements of the client.

Individual concepts

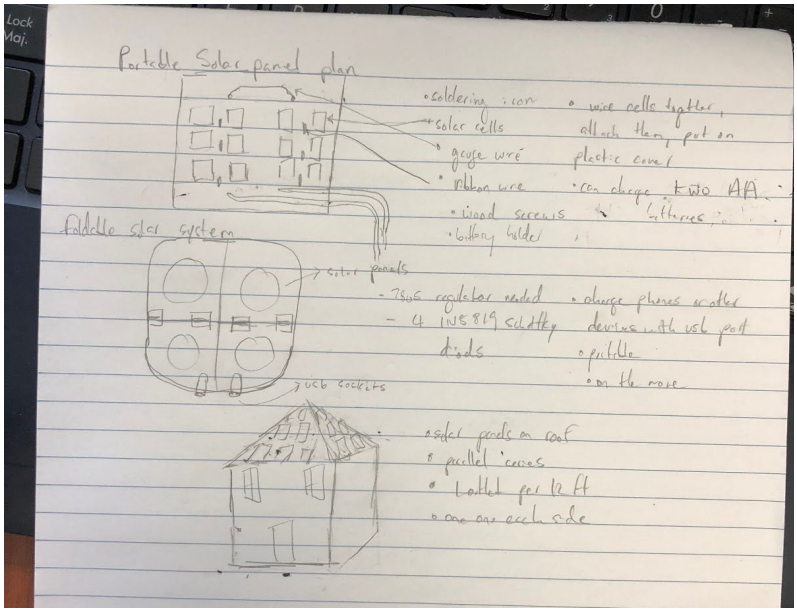
Justin Kearney



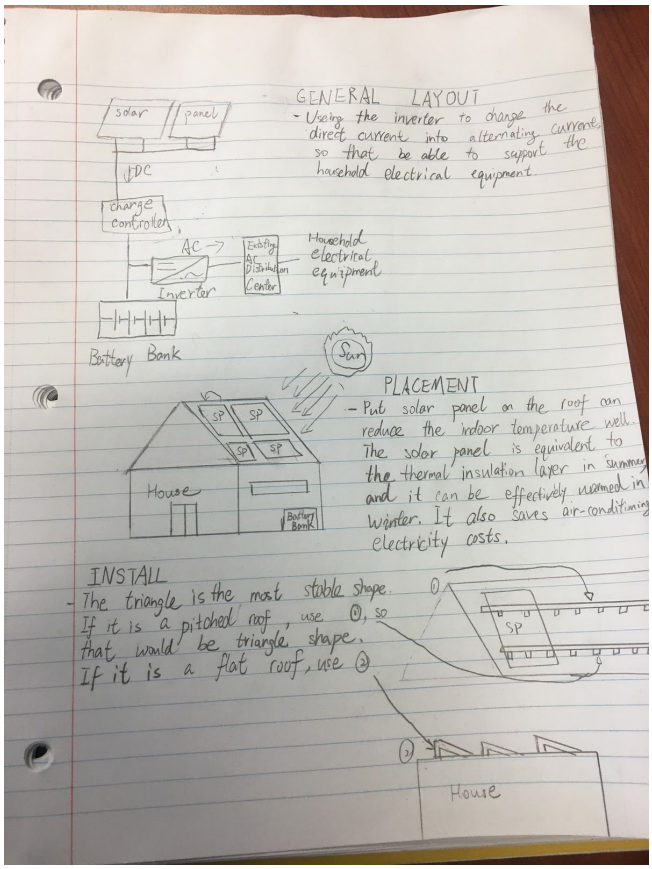




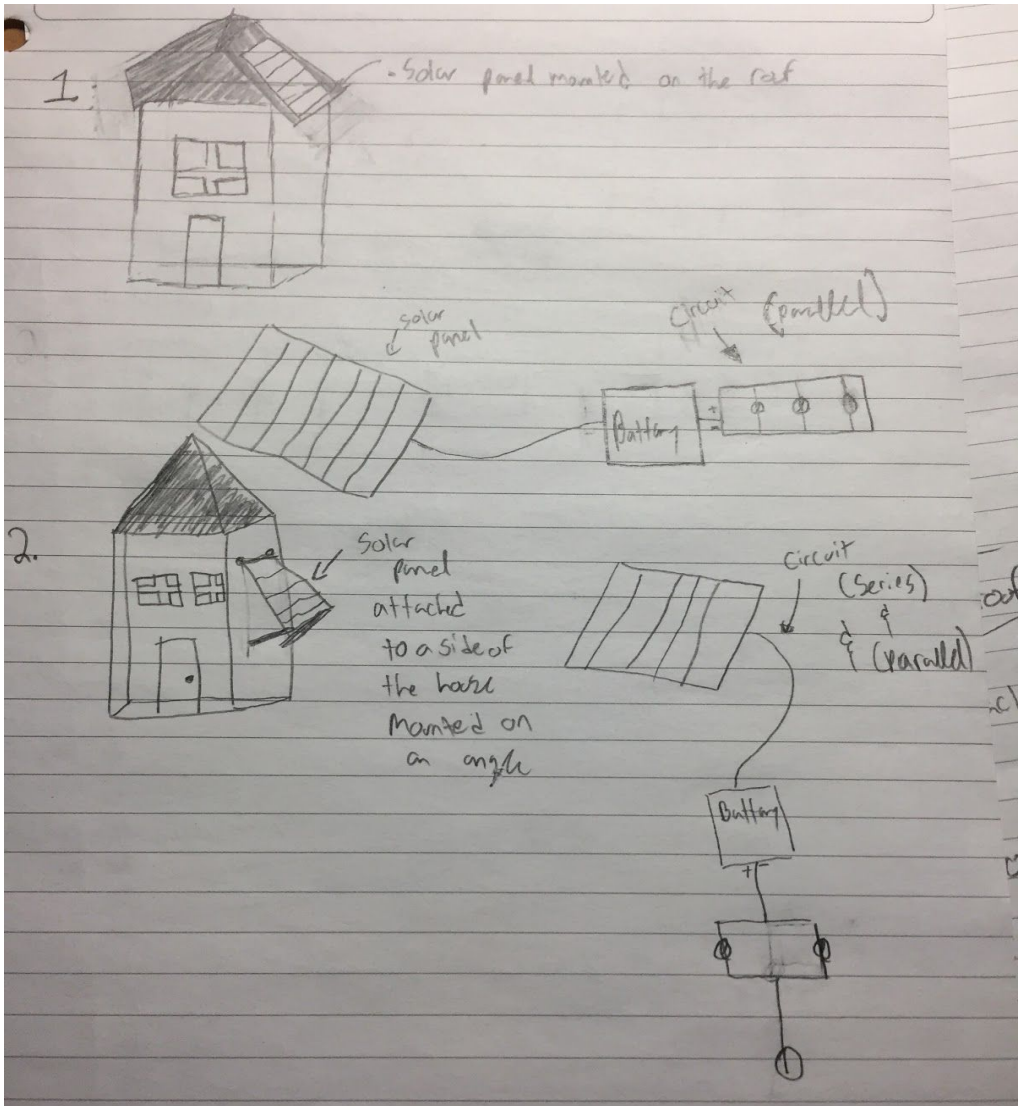
Angela Song

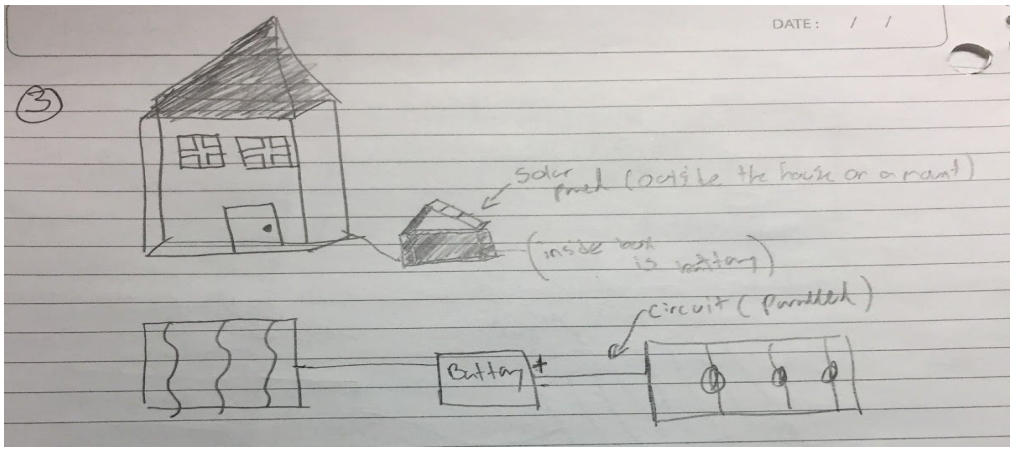


Kevin Huang

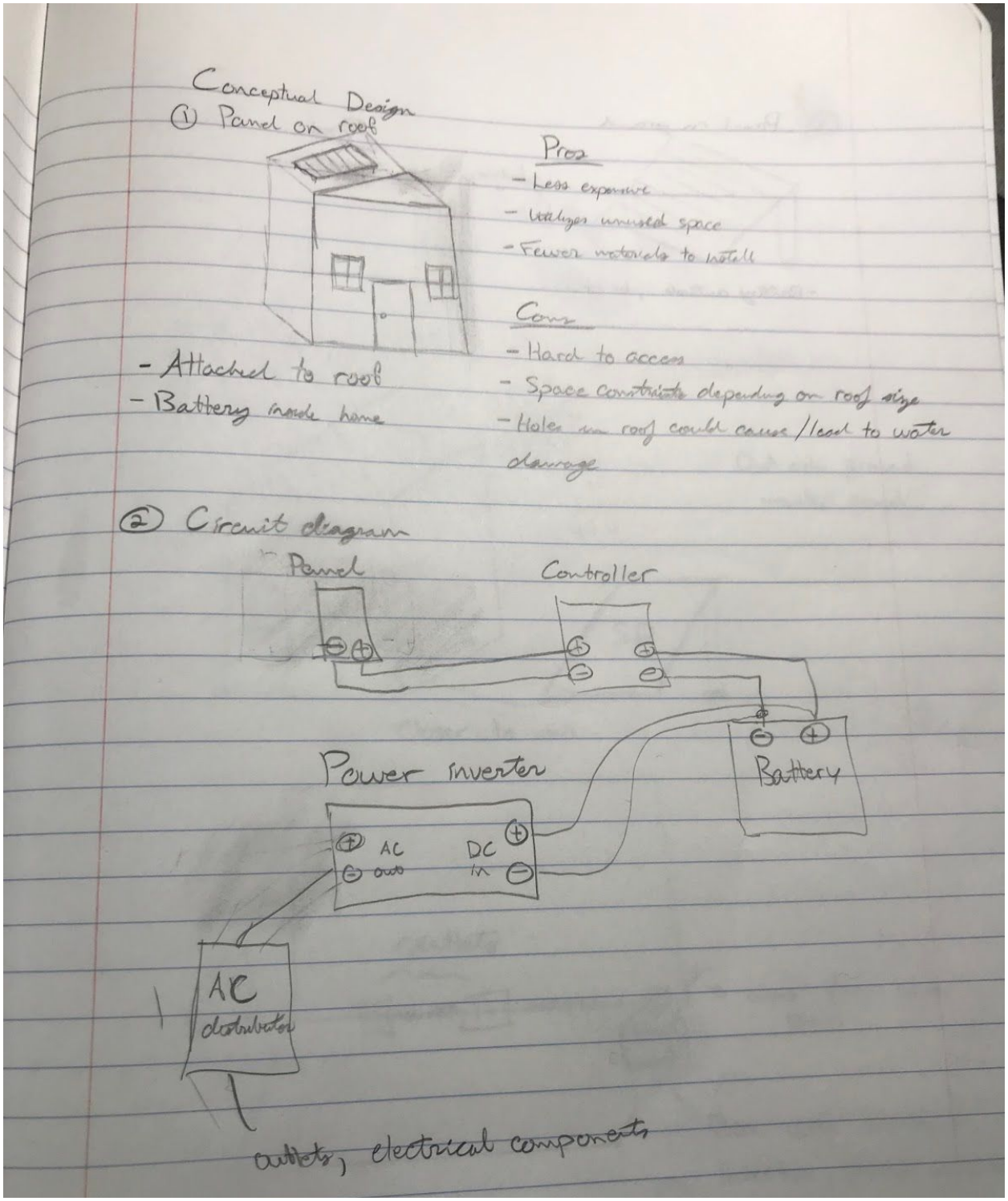


Josay Amaral

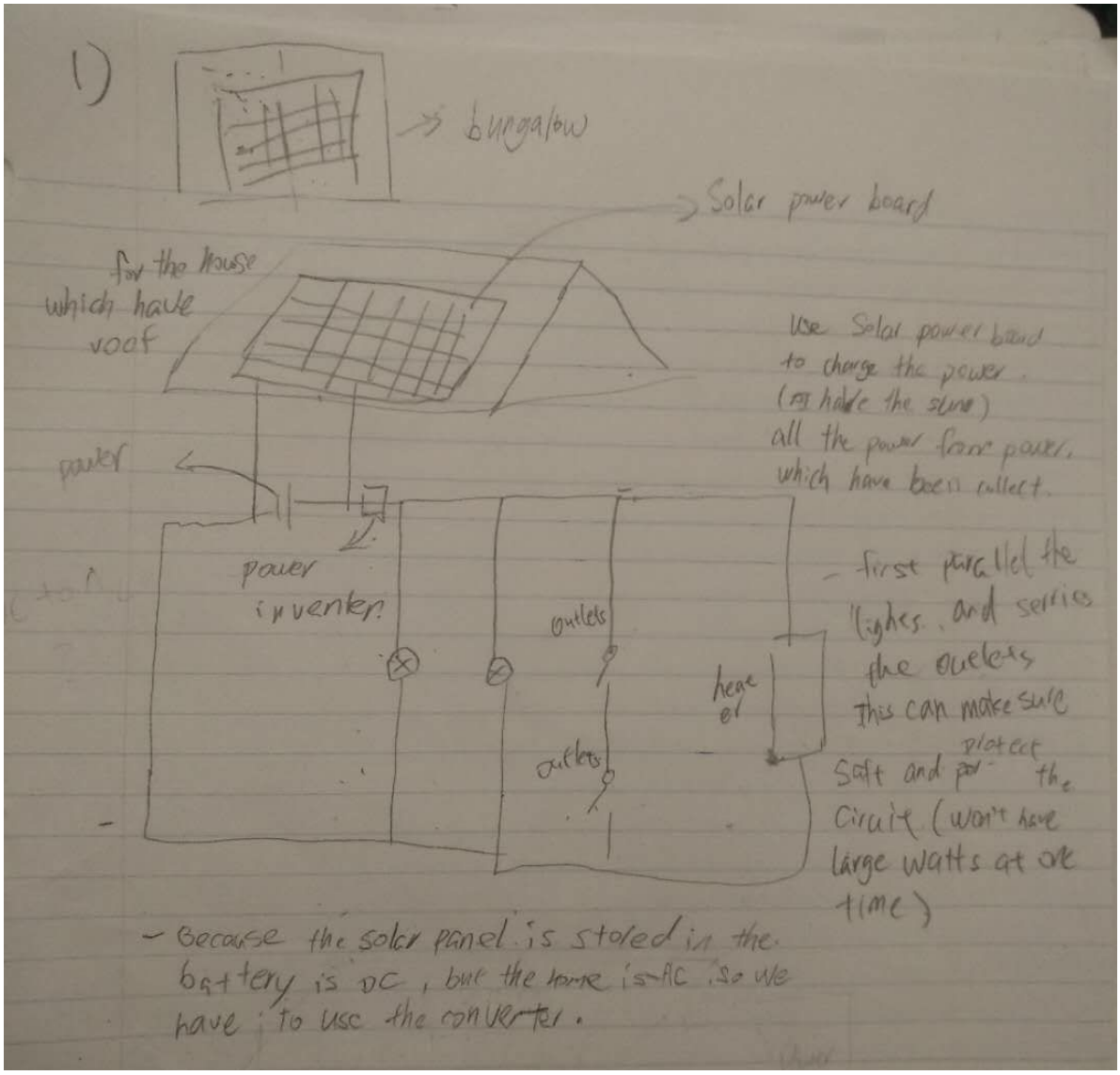


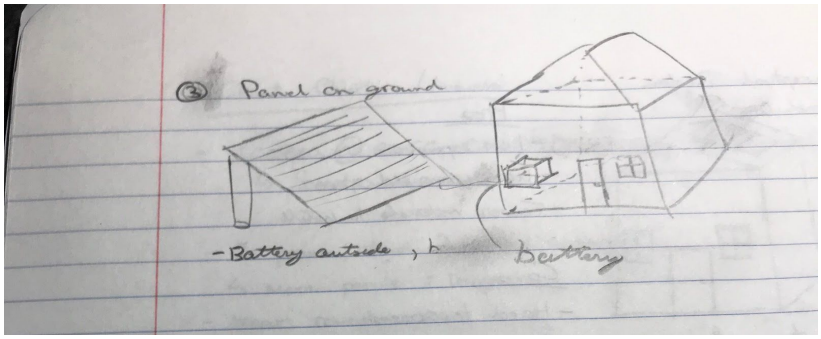


Thomas Atkinson



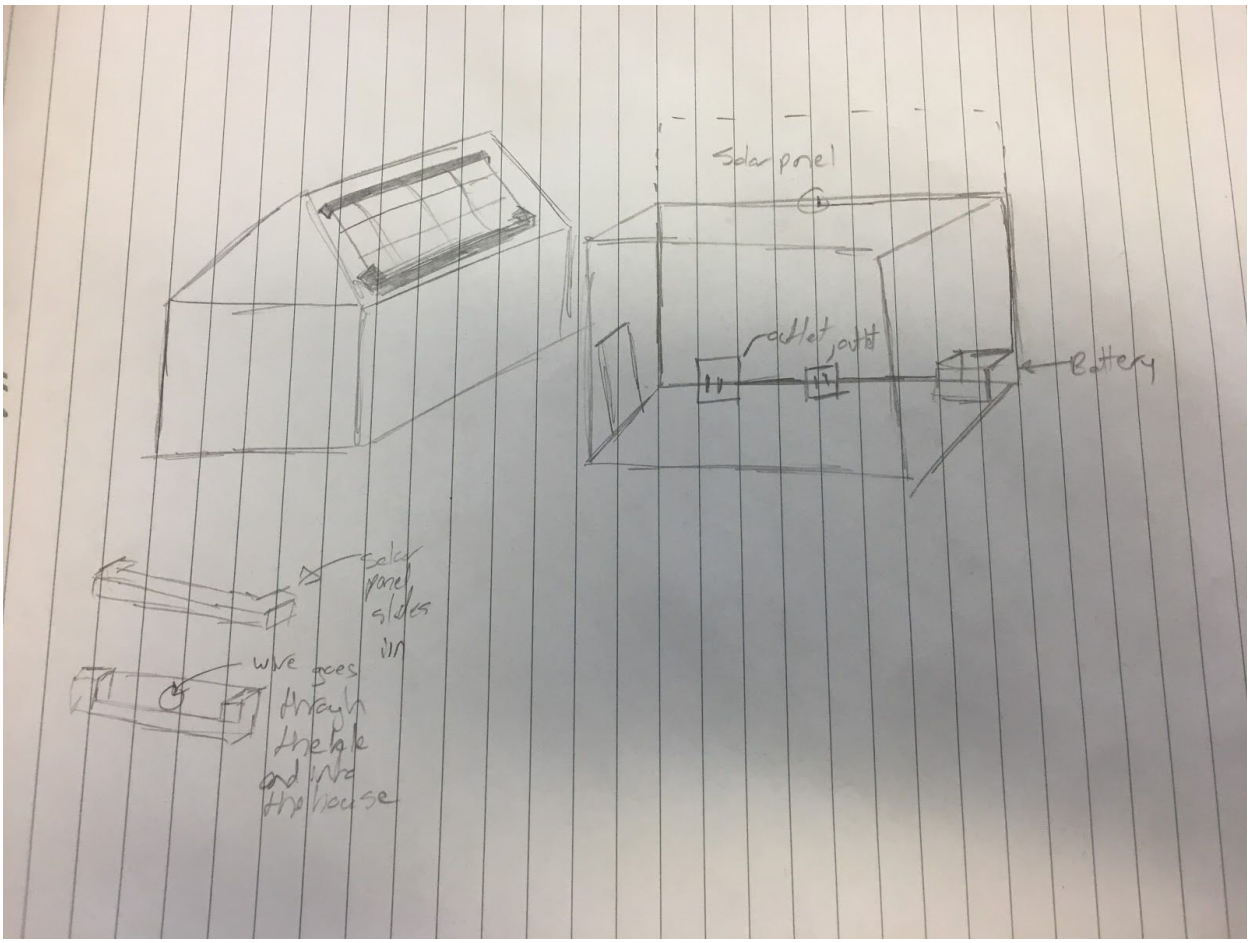
Zhangchi geng





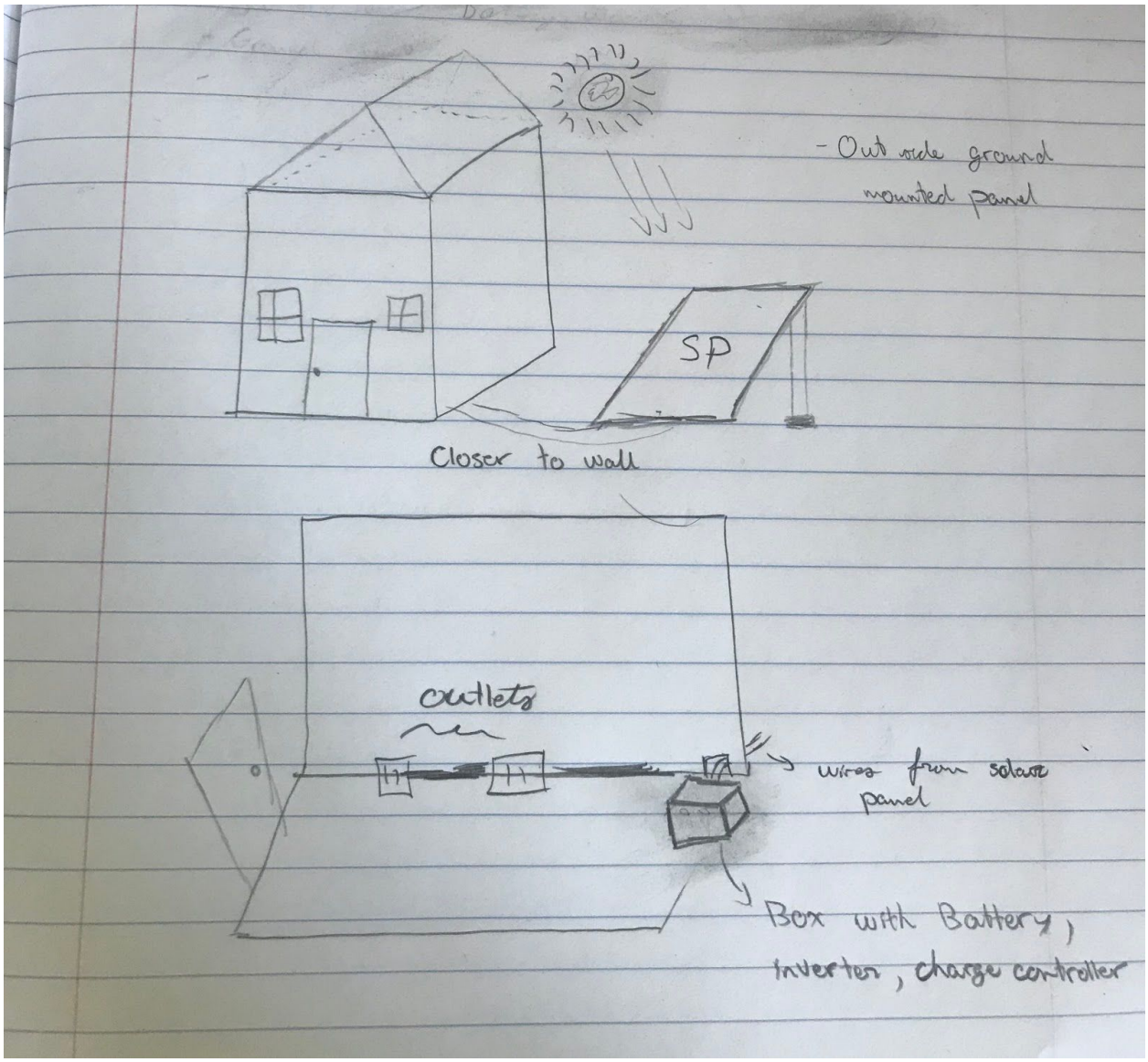
3 Final Concepts

Concept 1



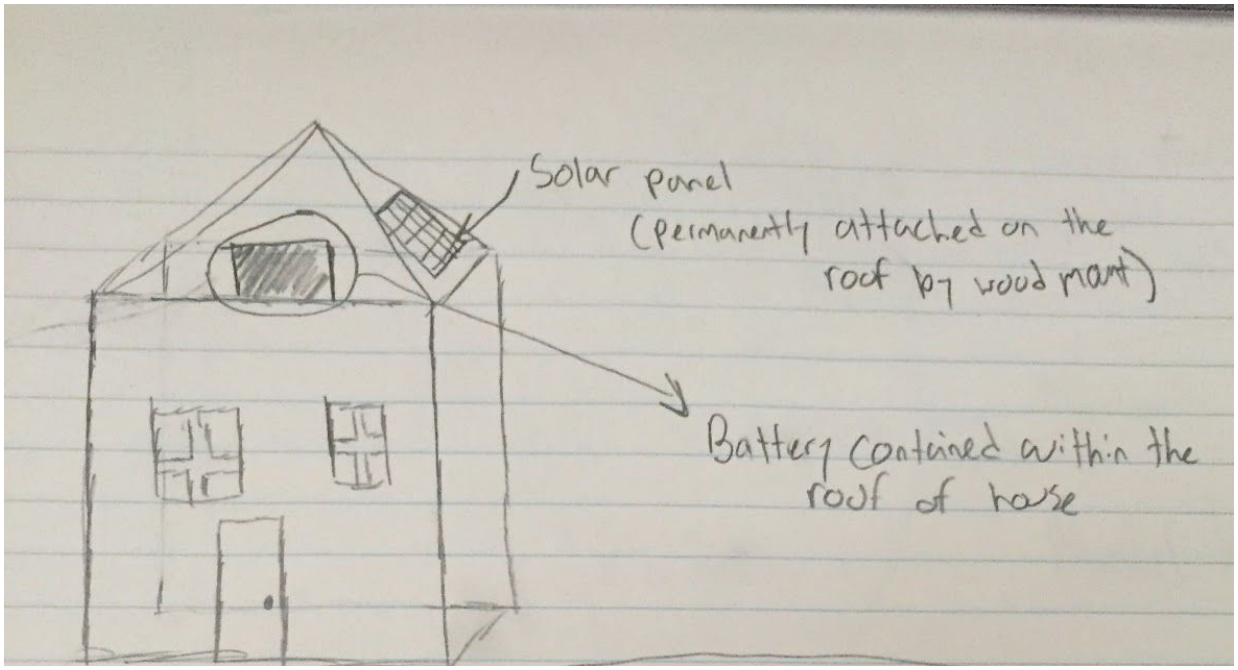
The solar panel is mounted onto the roof with a holder that keeps it in place. The panel just needs to slide in and then it is stable. The cable goes to the battery which is inside of a rubber bin with the controller, inverter, and controller. Electricity runs through the home on detachable wiring with outlets. The circuitry will accomodate the needs of each electrical system or appliance.

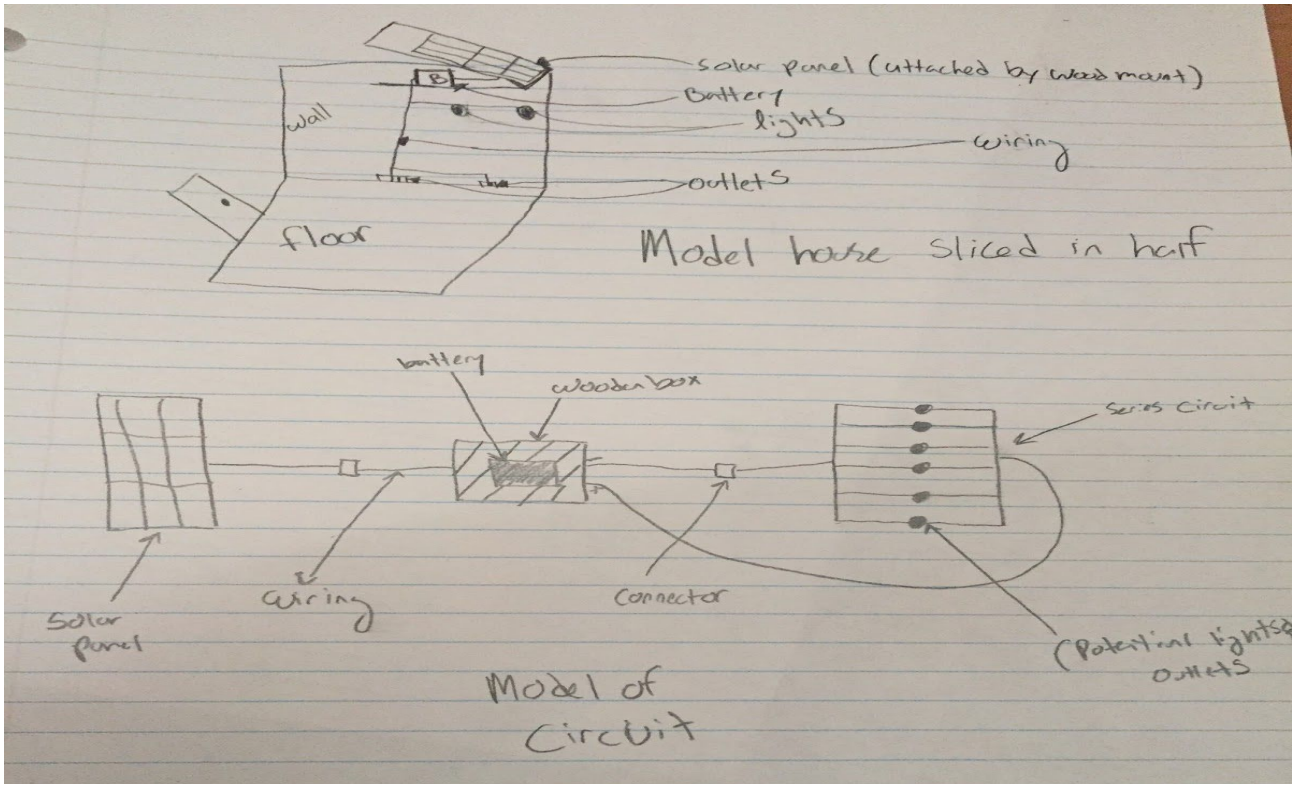
Concept 2



In this system, we put the solar panel on the outside of the house and close to the outer wall. Through the small hole on the outer wall, we pass through the wire to connect the battery, which is in the house, and there is a small box on the corner of the house. Put the box over the corner and inside of the box there are battery, inverter and charge controller. The reason why we invented the box is to put these things inside of the box, therefore everything looks clean and organized. We use wires and extension cables to connect outlets, light and heater.

Concept 3





In this system we placed the battery inside the roof of the house and placed it in a wooden box in order to protect the battery from any potential damage. The solar panel is permanently mounted

onto the roof via wood mounting in order to maximize potential energy consumption and limit and future complications. The circuitry for the lights, outlets, cooling and heating will be connected in parallel circuits in order to avoid all electricity being futile. The wiring will be placed down the wall which contains neither the door or windows to best avoid any external weather such as rain or snow. The wires will have specified places where it can be connected and disconnected easily to allow the house to be taken apart easily and with no complications.

Decision Matrix

Specifications	**<u>Concept 1</u> Slide-in mount Rubber Battery Container Detachable Cables**	**<u>Concept 2</u> Separated Panel Wooden Box Long Cables**	**<u>Concept 3</u> Battery in between Roof and ceiling Wiring down the Walls Wood mount for panel**
Amperage	2	2	2
Voltage	2	2	2
Safety	2	2	3
Costs	1	2	3
Lighting	2	2	2
Heating	2	2	2
Outlets	2	2	2
Tidiness	2	2	3
Setup Ease	3	2	1
Aesthetic	1	2	3
Total	**19**	**20**	**23**

The third concept will be chosen because of its superiority in the safety and aesthetics criteria. It is a safer solution because the wiring doesn't have to be all exposed and on the ground, it can run through the ceiling and come down only when it needs to. It also saves wiring because the wires

from the solar panel don’t have to travel far to get to the battery, and the wires don’t have to run back up the walls to get to the lights. This solution is a little harder to set up because the battery must be put in the roof but it is worth all the benefits that this brings. Overall, the third concept is the best.

Now that we have a solution in mind, we can work on a plan for execution, provide cost estimates, and prototype our solution moving forward. Also, having all these well documented solutions allows us to return to these concepts if something in the solution we chose happens to not work out.