Project Deliverable E: **Conceptual Design** GNG 1103 – Engineering Design

Faculty of Engineering - University of Ottawa

Present to :

Muslim Majeed

For the course :

Engineering Design

GNG 1103

By :

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Introduction

This report involves the tasks needed to be completed, estimated duration for each task, owner for each task, Gantt diagram for the tasks, project risks, plans to mitigate the risks and estimate of the cost for our greenhouse. Besides, the prototypes will be involved in the tasks. The Gantt diagram is created from Trello, and it will show the tasks, owners of tasks and the duration for each task.

Project Plan

- Decide the materials for prototype 1 (Valerie, Luke, Gwladys, Zehan)
- Discuss and design the construction of the greenhouse (All)
- Analysis of critical components or systems (All)
- Test our construction by Solidwork (prototype 2) (Valerie)
- Analysis of numerical or experimental model (Caleb)
- Discuss and design the final version of our greenhouse (prototype 3) (All)

For this project, we are going to do most of the tasks together, especially for those needed to be discussed, so that we can have more ideas and find a solution that everyone agrees with.

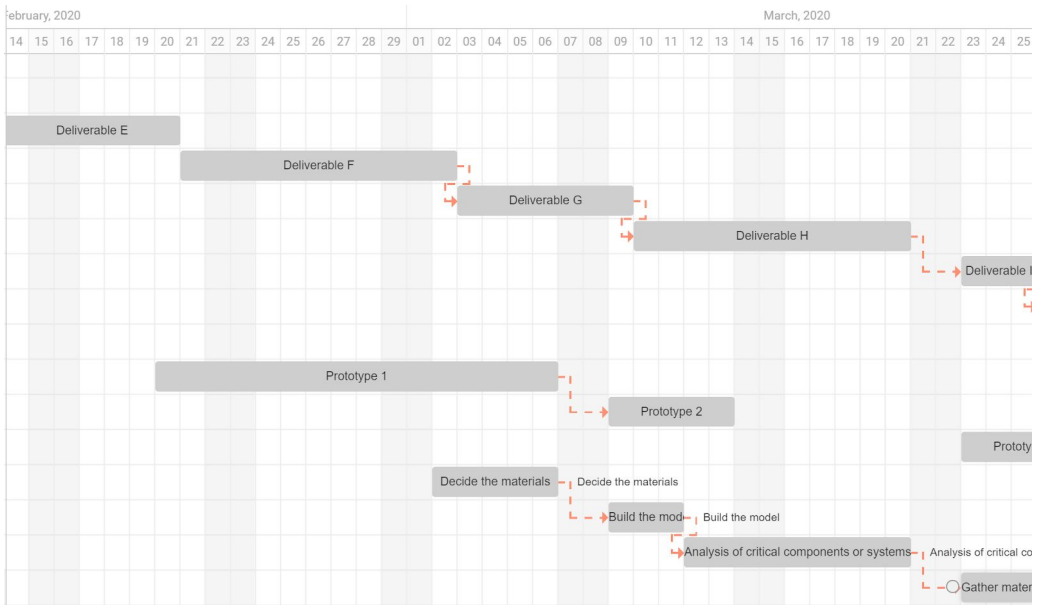
For the first prototype, all of us designed our own greenhouses, and we selected three of them to submit as our Deliverable D. After that, we discussed and chose one of Luke's designs. The model of Luke's design can be clearly discussed and built. Besides, the graph and the explanation can be easily presented to the client for feedback to improve our greenhouse. Then, we came to a decision that we are going to use wood

as our frame material and polycarbonate (or some materials that are similar to polycarbonate) as our panel material.

SolidWorks that we experienced in the Lab 6 can help us analyze our construction, we choose to use it for our second prototype. With SolidWorks, a clear graph of the greenhouse can be built; with benchmarking, the one that is the best suited and articulated design for our project and best design to overcome the problems we face as a group.

Finally, the final version of our construction will be decided to be made as our final presentation to the client. Before finishing the roof and walls of our greenhouse, our construction will be improved based on all of the client meetings and our discussions with the hydroponics group. For the final prototype, one member will purchase the materials with our TA and the others will finish the final frame of the greenhouse.

Gantt Diagram of tasks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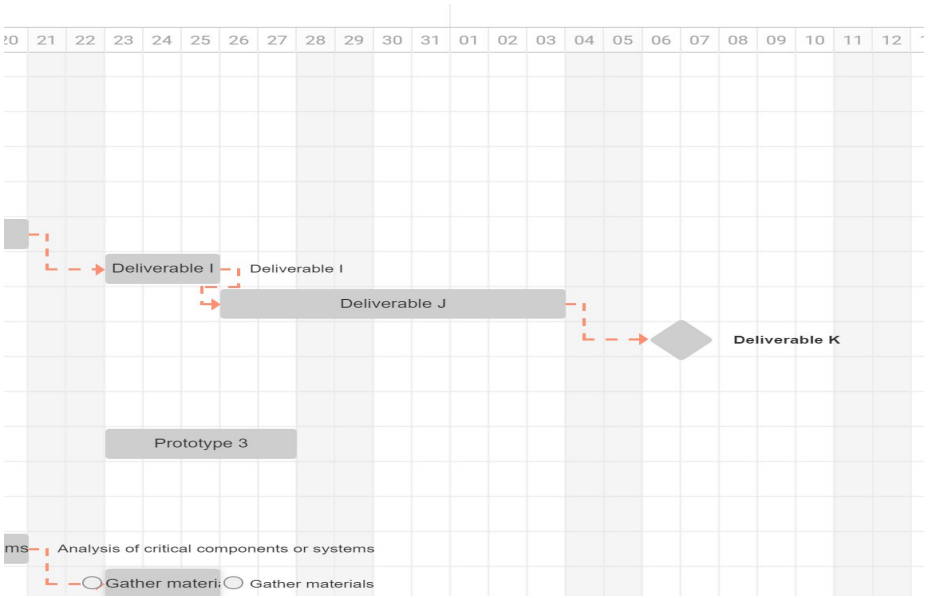
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Analysis of critical components or systems
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Project Risks:

Risk	Severity	Contingency Plans
The construction may not be as strong as we want to see.	High	We are going to add some more wood to the wall and make those wood in some certain shapes (like triangles) to support the construction.
The hydroponic system may not be realizable in our construction.	High	We will try to communicate more with the Hydroponic Team and show them our construction detailedly.
Our Prototype III may not work as we expected.	High	We will find the problems immediately and change parts of the construction instead of changing the whole construction. We will try our best to satisfy our client's needs.
The price of the materials that we need may exceed the budget.	Medium	We can try some other materials that are similar to the materials we want. Though the changed ones may not have the same good quality as the expensive ones, they can still be good choices (but they must be workable under both high and low temperature).
Some materials have to be bought online and the time for their arrivals are unpredictable.	Medium	We will communicate with our TA and see whether we can buy the materials in advance. If not, we have to replace those materials with others that are easier to get.

Cost Estimate:

Final Prototype		
Needs	Quantity	Price - CND$/ Piece
Screws and Nails	About 100	$40
Polycarbonate Plastic ’6 x ’6 and ’6 x ’8	2 and 3	$138
Plywood ’4 x ’8	5	$12
2” x 3” x 96”	6	$3
2” x 3” x 69”	18	$2.45
2” x 4” x 93”	4	$2.45

2” x 4” x 72”	2	$2.45
2” x 3” x 15”	5	$2.45
2” x 3” x 84”	5	$2.45
2” x 3” x 67”	4	$2.45

Framing would require at the very least 33 2”x3” boards which come at a length of 8’ at 2.45$ a piece so 80.85$ and 6 2”x3” boards at 3.00$ a piece so 18$ bringing the total to 100$ for just the framing.

Assuming that a 4x8 sheet of plywood (OSB more specifically) costs 12$ (from HomeDepot) and we would need at most 5 sheets is a cost of 60$ for the sheeting.

For roofing we have decided to use clear corrugated PVC sheets, with each sheet being 26” x 8’ we will need 4 for a cost of 16$ each (from HomeDepot) or total of 64$.

For siding we will be using polycarbonate and will likely use roughly half a 75’ roll (from HomeDepot) for a total of $138.

The whole construction also needs around at least 100 screws and nails for a cost of about $40.

Conclusion:

After the meeting with the team, we decided to choose Luke's Prototype which meets the requirement of the client. The next step was to analyse the needs and estimate the quantity and the cost of each material. After cost estimation, we found out that the total price of the final prototype will be $400.85 ($80.85 + $18 + $60 + $64 + $138 + $40 = $400.85). The Total price is less than the Budget which is $500 which is good. The rest could be used for the missing material during the project realization.